NONRESIDENT TRAINING COURSE

Date: March 2012

SEABEE COMBAT HANDBOOK, VOLUME 1

NAVEDTRA 14234A

S/N 0504LP0268720

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

PREFACE

By obtaining this rate training manual, you have demonstrated a desire to improve yourself and the Navy. Remember, however, this manual is only one part of the total Navy training program. Practical experience, schools, selected reading, and your desire to succeed are also necessary to successfully round out a fully meaningful training program.

THE MANUAL: This manual is organized into subject matter areas, each containing learning objectives to help you determine what you should learn, along with text and illustrations to help you understand the information. The subject matter reflects day-to-day requirements and experiences of personnel in the rating or skill area. It also reflects guidance provided by Enlisted Community Managers (ECMs) and other senior personnel, technical references, and instructions, etc., and either the occupational or naval standards that are listed in the *Manual of Navy Enlisted Manpower and Personnel Classifications and Occupational Standards*, NAVPERS 18068 (series).

THE QUESTIONS: The questions that appear in this manual are designed to help you understand the material in the text.

THE INTERACTIVITY: This manual contains interactive animations and graphics. They are available throughout the course and provide additional insight to the operation of equipment and processes.

VALUE: In completing this manual, you will improve your military and professional knowledge. Importantly, it can also help you study for the Navy-wide advancement in rate examination. If you are studying and discover a reference in the text to another publication for further information, look it up.

Center of Excellence

ACKNOWLEDGEMENTS

The Center for Seabees and Facilities Engineering (CSFE) would like to acknowledge assistance of the following personnel in preparation and validation of this NRTC:

BUC(SCW) Jason Verneris
Mr. Mitchell Jordan
Mr. Daniel Harvey
Mr. David Vieke
CUCM(SCW) Tim Bray
EAC(SCW) Gordon Schneider
LT(SCW) Marcia Fernandes
GYSGT Nicholas Williams
LCDR(SCW) Stephen Dakin
Mr. John Salas
Mr. John Pine
UTC(SCW) Eric Bailey
Mr. Ronald Andaya
BUC(SCW/EXW) Tim Fabrey
EOC(SCW) Tom Colesanti
Mr. Christopher Bissonnette
Mr. Scott Olson
GMC(SW) Eric Besserud
CUCM(SCW) William Clark
Mr. James Triplett

NAVEDTRA 14234A COPYRIGHT MATERIAL

Copyrighted material has been identified and approved and is listed below within this document.

Copyright Owner	Date	Chapter	Pages	Remarks
Johnson Outdoors Gear LLC	26 March 2012	2	2-11 and 2-12	

COPYRIGHT STATEMENT FOR RECORD PURPOSES:

This publication contains approved copyrighted material (©). In accordance, this manual is **only** available through Department of Defense (DoD) Navy Knowledge Online (NKO) or Non Resident Training Courses (NRTC) restricted websites. (PDF version only).

Sailor's Creed

"I am a United States Sailor.

I will support and defend the Constitution of the United States of America and I will obey the orders of those appointed over me.

I represent the fighting spirit of the Navy and those who have gone before me to defend freedom and democracy around the world.

I proudly serve my country's Navy combat team with honor, courage and commitment.

I am committed to excellence and the fair treatment of all."

Table of Contents

CHAPTER		PAGE
1.	History and Organization of the Seabees and the Laws of Armed Conflict	1-1
2.	Organizational Clothing and Equipment	2-1
3.	Organic Communications Equipment	3-1
4.	Combat Maneuvers, Formations, Patrols, and Ambushes	4-1
5.	Land Navigation	5-1
6.	Evasion, Survival, Escape, and Recovery	6-1
7.	Individual Protective Measures	7-1
8.	Entanglements	8-1
9.	Chemical, Biological, Radiological, and Nuclear (CBR-N) Defense	9-1
10.	First Aid and Field Sanitation	10-1
11.	Small Arms Weapons	11-1
12.	Crew Served Weapons and AT4	12-1
13.	Marksmanship and Techniques of Fire	13-1
14.	Hand Grenades, Land Mines, Pyrotechnics, and Improvised Explosive Devices	14-1
APPENDIX		
I.	Glossary of Common Terms	AI-1
II.	Acronyms	AII-1
III.	Work/Rest Table	AIII-1
INDEX		Index-1

Chapter 1

History and Organization of the Seabees and the Laws of Armed Conflict

Topics

1.0.0 Occupational Construction Skills

2.0.0 Concept of Organization and Chain of Command of the NCF

3.0.0 Organizations Supporting the Naval Construction Force

4.0.0 Laws of Armed Conflict

5.0.0 General Precepts of the Laws of Armed Conflict

6.0.0 Relations with the Country Being Entered

7.0.0 Your Conduct Under the Laws of Armed Conflict

8.0.0 What Happens When Rules are Violated

To hear audio, click on the icon: 

Overview

The Seabees are the Navy's construction force and few select teams, if any, enjoy a finer reputation among America's fighting men and women. During their short history, the Seabees have won fame, honor, and distinction as an organization that "Can Do," even when faced with practically insurmountable obstacles. In this chapter you will learn about the history of the construction force. You will also become familiar with the organization of the finest fighting construction team. Furthermore, you will learn about the laws of war and why we need them.

Objectives

When you have completed this chapter, you will be able to:

1. Describe the events that led to the establishment of the Civil Engineer Corps (CEC) and the Seabees.
2. Identify the general organization of the Naval Construction Force (NCF), types of Seabee Units within the NCF, and their objectives and organization.
3. Identify the services provided by the organizations that support the Naval Construction Force.
4. Identify the mission, function, and structure of the Naval Mobile Construction Battalions (NMCBs).
5. Describe the organization and mission of the Headquarters Company and the duties of its personnel.
6. Describe the duties of the rifle company personnel.
7. Identify the members of a rifle platoon and their duties.

8. Identify the members of a rifle squad and their duties.
9. Identify the members of a rifle fire team, their duties, and individual weapons.
10. Identify the fire support elements of the rifle companies in a battalion, and denote individual responsibilities.
11. Identify the members of the machine gun and antitank squads, their equipment, and duties.

Prerequisites

There are no prerequisites for completing this manual.

Features of this Manual

This manual has several features which make it easy to use online.

- Figure and table numbers are italicized within the handbook text. Figure and table reference numbers are conveniently located next to (or near) the applicable handbook text.
- Audio and video clips are included in the text, with italicized instructions telling you where to click to activate the appropriate link.
- Review questions are included at the end of this chapter as the chapter assignment. To submit assignments log into https://www.courses.netc.navy.mil, go to “Student Services”, in the drop down click on “Active Courses”, go to "View/Submit Answers" next to the course you wish to submit answers for. Assignments may be submitted to the above Web site as they are completed, and instant scoring is available. Your completion letter is available as soon as you pass all assignments.
- A form at the end of each chapter allows your input for improving the manual or correcting errors to be brought to the attention of CSFE’s Technical Review Committee. Your input is important and will help keep this manual up to date and free of technical errors.

1.0.0 OCCUPATIONAL CONSTRUCTION SKILLS

1.1.0 Civil Engineer Corps

The Navy CEC was established in 1867 to build and maintain the naval shore establishment. CEC officers are the Navy's uniformed professional engineers and architects who are billeted to and command NCF units, and who:

1. Execute and manage the planning, design, construction, operation, and maintenance of the Navy's shore infrastructure for Commander, Navy Installations Command (CNIC)
2. Serve as component and service staff engineers
3. Serve in Naval Facilities Engineering Command's (NAVFAC) public works and in Facilities Engineering and Acquisition Division (FEAD)/Resident Officer In Charge of Construction (ROICC) billets
4. Provide a unique combination as naval officer, expeditionary warrior, engineering professional, and acquisition business professional by:
   a) Developing warfighting skills through tours with NCF units and being required to achieve a warfare qualification as a Seabee Combat Warfare Specialist (SCW)
   b) Registering as a professional engineer or licensed architect in areas such as architecture or civil, mechanical, environmental, and electrical engineering
   c) Pursuing certification as an acquisition professional in their role as construction project managers

1.2.0 Seabees

The name Seabee has three distinct meanings. The context in which Seabee is used determines its meaning. For the purpose of this publication, the name Seabee is synonymous with personnel and units of the NCF. Seabees are referred to as one of the following:

- Enlisted personnel of the Navy's Occupational Field-7 (OF-7) ratings: builder, construction electrician, construction mechanic, engineering aid, equipment operator, steelworker, and utilitiesman
- All officers and enlisted personnel assigned to an NCF organization
- Units that make up the NCF

1.3.0 Seabee Occupational Skill

Seabee units consist of enlisted personnel with fleet and traditional Seabee OF-7 ratings. The Navy's fleet rating system uses broad enlisted career fields to classify personnel similarly to the Marine Corps' Military Occupational Specialty (MOS) ratings. Seabee occupational capability skills are identified for enlisted (E1–E8) personnel using the OF-7 construction ratings described below:

1. Builders, Builder Constructionman Recruit (BUCR) to Senior Chief Builder (BUCS), make up a large part of Seabees with skills similar to those of civilian construction workers. Builders are:
   - Bricklayers

- Carpenters
- Concrete finishers
- Masons
- Painters
- Plasterers
- Roofers

2. Construction Electricians, Construction Electrician Constructionman Recruit (CECR) to Senior Chief Construction Electrician (CECS), are responsible for power production and specialize as:
   - Construction and powerhouse electricians
   - Electrical repairmen
   - Linemen
   - Substation operators
   - Telephone repairmen

NOTE

Unless specifically trained and equipped, construction electricians do not work on high-power electrical distribution lines.

3. Construction Mechanics, Construction Mechanic Constructionman Recruit (CMCR) to Senior Chief Construction Mechanic (CMCS), perform maintenance and repair to the following heavy construction and automotive equipment:
   - Gasoline and diesel engines
   - Hydraulic and pneumatic systems
   - Ignition and fuel systems
   - Steering systems
   - Transmission and electrical systems
   - Materials handling equipment
4. Engineering Aids, Engineering Aid Constructionman Recruit (EACR) to Senior Chief Engineering Aid (EACS), assist civil engineers in developing final construction plans. They:
   - Conduct land and underwater surveys
   - Estimate costs
   - Perform quality assurance tests on common construction materials
   - Prepare topographic and hydrographic maps, sketches, and drawings
   - Schedule and plan site layout and grade control
5. Equipment Operators, Equipment Operator Constructionman Recruit (EOCR) to Senior Chief Equipment Operator (EOCS), are skilled in the following Civil

Engineering Support Equipment (CESE) and horizontal construction-related skill areas:

- Automotive vehicles and trucks
- Materials Handling Equipment (MHE) and Weight Handling Equipment (WHE)
- Pile driving, drilling, and blasting equipment
- Bulldozers, front-end loaders, excavators, and graders
- Cranes
- Rollers, graders, and asphalt paving equipment

6. Steelworkers, Steelworker Constructionman Recruit (SWCR) to Senior Chief Steelworker (SWCS), have skills similar to those of civilian steel workers. They are skilled in the following:
   - Rigging and special equipment used to move, hoist, and install materials such as structural steel and structural shapes
   - Placing, fitting, welding, cutting, bolting, and riveting steel shapes and reinforcing construction materials
   - Nonstandard bridge erection
7. Utilitiesmen, Utilitiesman Constructionman Recruit (UTCR) to Senior Chief Utilitiesman (UTCS), are skilled in the following plumbing and heating construction-related areas:
   - Air conditioning and refrigeration equipment
   - Compressed air systems
   - Fuel storage and distribution systems
   - Sewage collection and disposal facilities
   - Steam engineering systems
   - Water treatment and distribution systems

NOTE

Refer to Appendix D for a breakdown of unit manning numbers and a rank/rate structure breakdown for NCF units.

1.4.0 Rating Convergence

At the master chief (E9) level, Seabee ratings converge into the following three from the seven listed above:

1. Master Chief Equipmentman (EQCM) from the equipment operator and construction mechanic ratings
2. Master Chief Constructionman (CUCM) from the builder, steelworker, and engineering aid ratings
3. Master Chief Utilitiesman (UCCM) from the construction electrician and utilitiesman ratings

1.5.0 Construction Skill Knowledge

Active and reserve Seabee forces bring significant engineering and construction knowledge to the fight. Seabee units are well trained to accomplish the initial, temporary, and permanent construction standard levels. They have a broad scope of construction skills, building from entry-level skills gained at Class A schools to journeyman-level skills gained at Class C schools and on the job training. Although there are specialized ratings for engineering disciplines, Seabees often cross-train, working outside their ratings as crewmembers on construction projects, creating a versatile construction workforce. Many Seabee reservists also work full time in construction trade civilian careers, augmenting active duty forces with in-depth construction skills.

1.6.0 The First Seabees

The U.S. Navy Seabees were formed during World War II shortly after the Japanese attack on Pearl Harbor. Created by Admiral Ben Moreell, Chief of the Navy's Bureau of Yards and Docks in 1942, the Navy's Seabees were founded on the premise that experienced, armed construction workers were critically needed in combat areas of World War II to support the need for massive military construction. Civilian labor in war zones was impractical, so the first Construction Battalions (CBs) were established. This was the beginning of the Seabees, who obtained their name from a transliteration of "CB," for construction battalion. However, using seamen of the fleet to build shore-based facilities was not a new idea. Ancient Phoenicians, Romans, Greeks, and Egyptians did it. From the earliest days of the United States Navy (USN), Sailors who were handy with tools occasionally did minor construction chores at land bases. Admiral Moreell also gave the Seabees their official motto: *Construimus, Batuimus — "We Build, We Fight."*—as depicted in the Seabee's memorial statue in *Figure 1-1*.

Officially, permission to use the name "Seabee" was granted on 5 March 1942. Each year March 5th is observed as the anniversary of the Seabees.



Figure 1-1 — The Seabee's memorial.

1.7.0 Seabees in World War II

In World War II, the legendary deeds of the Seabees were recorded throughout both the Atlantic and Pacific theaters of operation. The Seabees built over 400 advance bases along five figurative roads to victory. All five of these roads started in the continental U.S. The North Atlantic road continued through Newfoundland to Great Britain, France, and Germany. The South Atlantic road continued through the Caribbean Sea to Africa, Sicily, and up the Italian peninsula. The North Pacific road continued through Alaska and along the Aleutian chain of islands. The Central Pacific road continued through the Hawaiian, Marshall, Gilbert, Mariana, and Ryukyu Islands. The South Pacific road continued through the South Sea Islands to Samoa, the Solomon Islands, New Guinea, and the Philippine Islands. The first Seabee Detachment, the Bobcats, left the U.S. in January 1942 and landed at Bora Bora in the Society Islands in February. The Bobcats were the advance party of more than 325,000 men who served in the NCF during World War II.

Less than two months later, Detachments 2 and 3 of Naval Construction Battalion 1 landed at Tongatabu and Efate in the South Pacific. These two islands and Bora Bora were on the supply route to Australia, which was being used as a staging area for the Allied Forces that were preparing for the counterthrust against the Japanese forces in the southwest Pacific. On these three islands, the Seabees constructed fuel tank farms, airfields, supply depots, and other facilities for supporting actions in the Coral Sea and Solomon Islands.

From then on the Seabees and their construction and fighting deeds became legendary. Side by side with Marines and Army troops, they fought and built along the Pacific roads to Tokyo and along the Atlantic roads through North Africa, Italy, France, and Germany. Their feats earned them the gratitude of the Allied fighting men who followed their trail in airplanes, ships, tanks, trucks, and on foot.

For example, in the Pacific, the Seabees built 111 major airstrips, 441 piers, 2,556 ammunition magazines, 700 square blocks of warehouses, hospitals for 70,000 patients, tanks for storing 100,000,000 gallons of gasoline, and housing for 1,500,000 men.

At Espiritu Santo in the New Hebrides, Seabees constructed a 5,000-foot airstrip from virgin jungle in 20 days. From this airstrip, bombers destroyed the big Japanese air base nearing completion on Guadalcanal.

The Marines then invaded Guadalcanal and engaged in the battle that reversed the course of the war. Within days after the Marine landing, Seabees were there filling the bombshell holes on Henderson Field faster than the Japanese could make them. They kept the precious airstrip in almost continuous operation despite frequent Japanese air raids and fleet shelling. At Cape Gloucester, Seabees bulldozed paths to the Japanese lines, so that American tanks could attack the hostile position. They landed with Marines at Tarawa and put a shell-pocked airfield in operation within 15 hours. At Tinian, in a nine-month period, the Seabees placed 6,000,000 square yards of asphalt paving—enough to pave a road from New York to Boston. At the same time, they excavated 12,000,000 cubic yards of coral, enough material to construct three dams the size of Hoover Dam.

Finally, by way of numerous islands such as New Georgia, Iwo Jima, Okinawa, and the Philippines, the Road to Tokyo was completed, and the Japanese formally surrendered in September 1945.

At the end of World War II, the rapid demobilization of the Seabees followed the same pattern that characterized the other Armed Forces. By June 1946, only 20,000 men remained on active duty.

Just before the Korean Crisis in June 1950, the number in active status dwindled to 2,800. With the declaration of the emergency, the active duty force was increased to over 14,000. This rapid expansion was possible because of the existence of the Seabee Reserve Organization.

1.8.0 Seabees in Korea

In Korea, Seabees rose to the challenge of the Cold War in the tradition of their “Can Do” predecessors. At the Inchon landing in September 1950, Seabees positioned pontoon causeways within hours of the first beach assault, and did it while under continuous enemy fire and in the face of enormously strong tides.

In addition to amphibious operations, Seabees were broken up into numerous detachments to service the K-fields of the various Marine air groups. Each airfield of the Marine air groups was designated with a “K” number, such as K-3 at Pohang, K-18 at Kimpo, Seoul, and K-2 at Teagan.

As the war continued, the need arose for an advance airfield to retrieve damaged aircraft unable to reach home bases or carriers after raiding the North Korean interior. The project was code-named Operation “Crippled Chick,” and a detachment of Seabees was sent to Yo Do in the Bay of Wonson to build an airstrip. The Seabees were given 35 days to complete the job, but they had the strip ready in 16 days. While building the

strip, the Seabees were under constant artillery bombardment from enemy forces on neighboring islands.

The rapid demobilization that followed World War II was not repeated after the signing of the Korean Armistice in July 1953. The Cold War had created a necessity to maintain military strength and preparedness. Crises in Berlin, Cuba, Africa, South America—and especially in Southeast Asia—kept the Seabees strong and active. Just before the outbreak of the Korean War, a basic reorganization of Seabee battalions was in progress. During this war, the reorganization was substantially completed. Two distinct types of battalions were established to gain specialization and mobility and are still in existence today. The Amphibious Construction Battalions (PHIBCBs) are landing and docking units with the mission of placing causeways, constructing pontoon docks, and performing other functions necessary for landing personnel and equipment in the shortest possible time. The NMCBs are responsible for land construction of a wide variety, which includes military camps, roads, bridges, tank farms, airstrips, and docking facilities.

1.9.0 Between Korea and Vietnam

Wide diversity marked the activity of the reorganized battalions during the decades following the Korean Armistice. The tasks of Seabees were the tasks of a watchful peacetime. Wide-ranging, of tremendous variety, many were pioneering and experimental as well. They were a part of the Navy's developing roles in defense and science. In this decade, Seabee builders were again on six continents.

More building and less fighting became the keynote of Seabee activities, and their peacetime achievements were no less impressive than those of wartime. On Okinawa, for example, the Seabees built a Marine Corps air facility using concrete precasting methods that earned the admiration of contractors throughout the Pacific area. Elsewhere, a small detachment of Seabees supervised and instructed Ecuadorians in modern construction methods while building a new Ecuadorian Naval Academy.

Beginning in 1955, Seabees began deploying yearly to the continent of Antarctica. As participants in Operation DEEP FREEZE, their mission was to build and expand scientific bases located on the frozen continent. The first "wintering over" party included 200 Seabees, who distinguished themselves by constructing a 6,000-foot ice runway on McMurdo Sound. Despite a blizzard that once destroyed the entire project, the airstrip was completed in time for the advance party of Deep Freeze II to become the first men to arrive at the South Pole by plane. The Seabees' next assignment was to build a permanent scientific base on the continent. Over the following years, and under the most adverse conditions, Seabees added to their list of accomplishments such things as snow-compacted roads, underground storage, laboratories, and living areas. One of the most notable achievements took place in 1962, when the Navy's builders constructed the continent's first nuclear power plant at McMurdo Station.

By far the largest and most impressive project tackled by the Seabees in the 1950s was the construction of Naval Air Station (NAS) Cubi Point in the Philippines. Civilian contractors—after taking one look at the forbidding Zombales Mountains and the maze of jungle at Cubi Point—claimed it could not be done. Nevertheless, the Seabees proceeded to do it. Begun in 1951, at the height of the Korean War, it took five years and an estimated 20-million man-hours to build this new, major Navy base. At Cubi Point, Seabees cut a mountain in half to make way for a runway nearly two miles long. They blasted coral to fill a section of Subic Bay, filled swampland, moved trees as much as 150 feet tall and 6 to 8 feet in diameter, and even relocated a native fishing village.

The result was an air station, and an adjacent pier that was capable of docking the Navy's largest carriers. Undoubtedly as important as the finished project, however, was the indispensable leadership and construction experience gained by the postwar generation of Seabees. The construction of NAS Cubi Point was a mammoth learning experience as well as a job well done.

In 1960, the Seabee reserve organization began a series of important changes. Following the Korean War the reserve grew to 242 divisions, each with 4 officers and 50 enlisted men. In July 1960, the Chief of Naval Operations (CNO) granted authority for the establishment of 18 reserve battalions. These battalions were to be formed from the reserve divisions. In July 1961, battalion active duty training was initiated. In July 1967, the CNO approved the establishment of four regimental staffs; later an additional four staffs were approved. This process of evolution culminated in the establishment of the 1st Reserve Naval Construction Brigade in September 1969. The brigade exercised overall control of the Reserve NCF.

In 1961, the Seabees assembled a huge floating dry dock at Holy Loch, Scotland, for the service and repair of the Polaris missile submarines that cruised beneath the waters off northern Europe. The dry dock, with a submarine tender anchored alongside, gave the vital submarines a base that ended long transocean cruises for the purpose of repair and resupply.

In 1962, Project Judy brought the Seabees to the historic Greek plain of Marathon. Living in a tent camp in a rural community, they built a naval communication station from scratch. When the job was completed in 1965, the Seabees had fabricated and erected more than 100 major antennae and created a base with all the comforts of home.

Seabees participated in building missile ranges in the Atlantic and Pacific. They also constructed housing and apartment complexes for U.S. servicemen and their families.

As indicated by the above-cited construction projects, Seabees during this period could be found everywhere. NMCBs regularly deployed to Guam, Okinawa, Midway, the Philippines, Cuba, Newfoundland, and Spain. Seabee detachments could also be found at dozens of smaller U.S. naval facilities throughout the world. The Seabees' primary mission was base expansion and maintenance. Their assignments included building and paving roads, laying sewer lines and water mains, building airfield and harbor facilities, restoring and converting old structures for new uses, wiring buildings, and erecting power lines. Such duty kept the battalions in a high state of readiness for the eventuality of advanced base building and amphibious support when war came again. The Cold War era was not without crises. In 1958, when dissidents threatened to overthrow the government of Lebanon and U.S. assistance was requested, Seabees brought the Marines ashore over their pontoon causeways. In addition to participating in the landing, Seabees were divided into beach salvage teams to recover swamped equipment, improve beaches, and build roads.

Seabees were once again poised for action and on the scene in 1962 when, following the successful conclusion of the Cuban Missile Crisis, it was felt that Fidel Castro's regime might retaliate against the U.S. Naval Base at Guantanamo Bay, Cuba. Under the constant threat of imminent ground attack or sniper fire, Seabees worked with speed and skill to fortify the base perimeter.

During this period Seabees assumed yet another new role, that of an operationally ready disaster relief force. Trained to build and fight, Seabees proved equally capable of quickly rebuilding ruins and combating peril. When an earthquake devastated the Greek island of Cephalonia in 1953, Seabees took part in emergency relief operations. In mid-

January 1961, Seabees improvised and used pontoons to save a California beach community threatened by tremendous tides. Seabees restored power and rebuilt damaged structures when Typhoon Karen destroyed much of Guam in 1962. Later, in 1964, Seabees were on the scene restoring utilities and building roads in a matter of hours after Alaska was struck by a devastating earthquake and tidal wave. When yet another typhoon ravaged an island in the Azores, Seabees arrived quickly with prefabricated housing units to lend vital assistance to the homeless. On several occasions, Seabees also manned their equipment to successfully battle forest and brush fires in the United States.

In the late 1950s and early 1960s, Seabee teams, another proud addition to the Seabee family, were born. This era marked the first use of these small detachments for local military aid and socioeconomic projects in underdeveloped countries. By 1963, this vital aid program was refined in both organization and control, and became a regular feature of Seabee activity abroad. Seabee teams usually consisted of thirteen carefully selected, experienced men: one junior CEC officer, eleven constructionmen, and a hospital corpsman. Such teams proved exceptionally effective in rural development programs and for teaching construction skills to people in such diverse locations as Africa, Central and South America, Southeast Asia, and later in the Trust Territories of the Pacific Islands. For instance, in 1962, a Seabee team arrived in the Republic of Haiti to restore a collapsing municipal pier that was vital to the national economy. The following year Spanish-speaking Seabees built and staffed a technical school in Santo Domingo. A Seabee team in Costa Rica protected the imperiled city of Cartago from a disastrous mud-flow by building dams and dikes. In other far-flung locations Seabee teams constructed roads, schools, orphanages, public utilities, and many other community structures.

However, much more important than the actual construction work they accomplished were the skills team members imparted to the local residents. Their true success was in enabling the local populous to continue old projects and initiate new ones long after Seabees left the region. There is no doubt that the “Can Do” Seabee teams have more than earned their additional measure of recognition as “the Navy’s Peace Corps.”

It was during the summer of 1964 that the Seabees first went to work for the State Department. The program was initiated following the discovery of electronic surveillance devices planted throughout the U.S. embassy in Moscow. To prevent future incidents of this nature, Seabees were used to perform all construction and renovation in security-sensitive areas of Foreign Service facilities abroad. In addition, they were tasked with the supervision of private contractors assigned to do construction work in nonsensitive areas. Despite its beginnings in 1964, it was not until 1966 that the Naval Support Unit, State Department, was officially established to administer Seabees assigned to support the Foreign Service. Because of the superb on-the-job performance of these Seabees, the State Department happily made them a permanent part of its operations.

Thus, a peacetime pattern of battalion training and deployment took shape in the years following the Korean War. This pattern, however, was drastically altered in 1965. The war in Vietnam brought American military intervention on a large scale and effected major changes in Seabee activity worldwide. In the spring of 1965, there were 9,400 Seabees on active duty at various sea and shore locations; most of these Seabees were assigned to ten reduced-strength NMCBs. These relatively few Seabees, however, were fully prepared to write a new chapter in the history of the Seabees.

1.10.0 Seabees in Vietnam

In South Vietnam, the Seabees built and fought and established a new reputation for their deeds of construction while under fire from the demilitarized zone in the north to the delta region. In the south, they supported combat operations and sometimes fought side by side with Marine Corps and Army troops in guerrilla-infested areas.

The first full Seabee battalion arrived in Vietnam on 7 May 1965 to build an expeditionary airfield for the Marines at Chu Lai. Others soon followed. From 1965 until 1969 the Seabee commitment in Southeast Asia rapidly increased, necessitating first the transfer of Atlantic Fleet battalions to the Pacific through a change of homeport, then the deployment of Atlantic Fleet NMCBs to Republic of Vietnam (RVN), and later the reactivation of nine additional battalions. This effort was culminated by the call to active duty of two reserve NMCBs in May 1968, bringing the number of battalions deploying to RVN to 21. In addition, there were two PHIBCBs lending support to the RVN effort. In the same time period, with a requirement for Seabees to support in-country activities such as naval support activities at Danang and Saigon, two Construction Batallion Maintenance Units (CBMUs), two deployed Naval Construction Regiments (NCRs) and the deployed Third Naval Construction Brigade rapidly increased. To support these various requirements, the total Seabee community grew from 9,400 to more than 29,000 in 1968 and 1969.

To help meet the mushrooming RVN requirements, the Navy used the concept of recruiting skilled construction workers at advanced pay grades. The Direct Procurement Petty Officer Program, reminiscent of early World War II recruiting efforts, proved to be highly successful in terms of both total numbers recruited (more than 13,000) and quality of input.

Seabee accomplishments in Vietnam were impressive, just as they were in World War II, in Korea, and during peacetime. All 21 active battalions deployed to Vietnam (some several times) to build the roads, airfields, cantonments, warehouses, hospitals, storage facilities, bunkers, and other facilities that were needed to continue the struggle. In accordance with the “mobile” concept of the NCF, Seabee units supported Marine, Navy, Army, and Air Force operations at camps and landing zones throughout RVN and at such outposts as Con Thien, Khe Sanh, and Gio Linh.

For their efforts in Vietnam, Seabee units and individual Seabees received formal recognition in the form of numerous commendations and medals. Moreover, it was in Vietnam that the first Seabee in history, CM3 Marvin G. Shields, a member of Seabee Team 1104, was posthumously awarded this nation’s highest recognition, the Medal of Honor, for his heroic efforts in defense of a special forces camp and Vietnamese district at Dong Xoai, as seen in *Figure 1-2*.



Figure 1-2 — CM3 Marvin G. Shields.

In a war in which the winning of people was an important part of the total effort, Seabee construction skills and medical assistance proved powerful weapons. The recitation of events and the quoting of statistics fail to

reflect the true color of the Seabees' involvement during the Vietnam years. Later they supported the Marines at Chu Lai and Khe Shan; reopened the railroad between Hue and DaNang; struggled with the logistics problems of the Mekong Delta; constructed a new naval base on a sand pad floating on paddy mud; and built staggering quantities of warehouses, aircraft support facilities, roads, and bridges. But they also hauled and dumped tons of rock for paving roads to provide access to farms and markets; supplied fresh water to countless numbers of Vietnamese through hundreds of Seabee-dug wells; provided medical treatment to thousands of villagers; and opened up new opportunities and hope for generations to come through Seabee-built schools, hospitals, utilities systems, roads, and other community facilities. Seabees also worked with and taught construction skills to the Vietnamese people, helping them to help themselves, and proved that the Seabees really are "builders for peace."

1.11.0 Post Vietnam

After Vietnam, when de-escalation of U.S. activity in Southeast Asia got underway, Seabee strength was once again reduced. By September 1970, the NMCBs were down to the planned post-Vietnam level of ten full-sized battalions. Because of the reduction of the NCF in Vietnam, on 6 December 1969 the HQ of the Thirtieth NCR was moved from Vietnam to Okinawa in the Ryukyu Islands, and on 1 May 1971, the HQ of the Thirty Second NCR was moved from Vietnam to Roosevelt Roads, Puerto Rico. By the end of 1971, most Seabees were employed outside of Southeast Asia. Thus, on 9 November 1971, the THIRD U.S. Naval Construction Brigade was disestablished.

As the Seabees entered this new era, they found themselves employed on major peacetime projects that had been deferred or neglected because of wartime priorities. Alert battalions were reestablished in the Atlantic Fleet at Roosevelt Roads in Puerto Rico and in the Pacific Fleet at Okinawa in the Ryukyu Islands. The men in the NCF found themselves employed outside their homeport fleet areas. No geographic limitations existed as battalions and details were deployed to satisfy the current and ever-increasing demand for Seabee expertise. For example, since the reestablishment of the alert battalions, one battalion, NMCB FOUR, served in 1970 as the Pacific alert battalion at Okinawa and in 1972 as the Atlantic alert battalion at Roosevelt Roads.

The post-Vietnam Seabees were involved in new construction frontiers: the Indian Ocean, the Trust Territory of the Pacific Islands, Europe, on the ocean floor, and in most of the oceans of the globe. Though younger and lower in number than their World War II predecessors, Seabees continued to demonstrate the same old "Can Do" spirit.

One of the major peacetime projects undertaken by Seabees after Vietnam was the development, construction, and operation of a U.S. naval communications station on Diego Garcia. Diego Garcia is one of the 52 coral atolls of the Chagos Archipelago in the Indian Ocean, 960 miles south of India and 7 degrees south of the equator. Construction was started early in 1971, and the establishment ceremonies were held on 20 March 1973. The station became a complete operating entity and included transmitting and receiving facilities, berthing, and mess facilities; an airfield to accommodate logistical aircraft; utilities, roads, shops, and other support facilities; a fuel storage farm; and an entrance channel and turning basin within the interior lagoon.

During the 1970s, the mission of the Diego Garcia facility was greatly expanded as the Indian Ocean and Persian Gulf assumed new strategic importance for the United States. The decision was made to develop Diego Garcia as a major support base for U.S. forces operating in the Indian Ocean area. Seabee battalions and detachments continued to deploy to Diego Garcia throughout the 1970s, with at least one full

battalion always in residence. During these years, the Seabees extended the existing runway; added to the power plant, subsistence, and receiver buildings; expanded the pier and the Petroleum, Oils, and Lubricants (POLs) facilities; and built additional personnel support and supply facilities.

Other projects on which Seabees worked in the 1970s included the upgrading of recreational and living facilities at the Naval Communication Station, Nea Makri, Greece. There, they built a radio facility; improved the base swimming pool; built tennis courts, a softball field, and an addition to the enlisted men's club; and remodeled the barracks. At the Naval Facility, Souda Bay, Crete, Seabees built an open storage facility, a pipe and canvas enclosure, and a helicopter pad. In Sigonella, Sicily—at the Naval Air Facility—they installed diesel units and "no break" generators, remodeled barracks and the general mess, and built an air-frames repair shop, power-check pad, ordnance magazine, enlisted/CPO club, handball court, and theater. At the Fleet Support Office, La Maddalena, Italy, the Seabees built a gymnasium and a playing field unit.

In Spain, the Seabees worked on a number of projects at Naval Station (NAVSTA) Rota. These projects included remodeling barracks and the enlisted club; building additions to the base telephone exchange, warehouse, and calibration laboratory at the airfield; installation of a new fender system on Pier #2; and a causeway connection. They also reconstructed the Rota Seabee Camp, which had deteriorated because it had been vacant from 1965 until 1971. In London, England, Seabees remodeled a Marine barracks; in Greenock, Scotland, they built a bowling alley; in Holy Loch, Scotland, they renovated the public works department garage and the hobby shop facility; at the Naval Security Group Activity, Todendorf, Germany, they built an addition to an operations building and installed a new emergency generator.

Meanwhile, in the Pacific, the major efforts of the Seabees were centered on Okinawa in the Ryukyu Islands and on Guam in the Marianas Islands. At Okinawa they performed many different and challenging assignments. The jobs included new structures at Camp Kinser—a new water pipeline, a modern underground electrical distribution system, and a major land-grading project at the Marine Corps Air Facility at Futema.

On Guam, Seabees were hard at work on a Seabee Camp. The camp, dedicated to William Lee Covington (a young CEC officer killed in Vietnam), included approximately 39 pre-engineered buildings, housing facilities, offices, shops, a galley, living quarters, a chapel, and utilities. Other projects completed during the 1970s included a major swimming pool complex at the naval hospital; a culvert and earthmoving project at the naval magazine; a CPO club, community center, and teen center at the naval communication station; and four steel buildings at Polaris Point submarine facility.

Seabees in Taiwan worked on the rehabilitation of barracks and on the construction of duplex cabins; at Iwakuni, Japan, they worked on a Marine Corps confinement facility, an exchange warehouse, and a water line. In the Philippines they constructed an aircraft rinse rack and runway support facilities.

In Puerto Rico, Seabees renovated roads during the 1970s, built a commissary and new buildings at Camp Moscrip, and carried out numerous civic action projects. During 1977, Seabees carried out a beach-erosion preventive project in Argentia, Newfoundland, and rehabilitated housing at Guantanamo Bay, Cuba.

The Seabees were also active in Antarctica again after the Vietnam War. As part of Operation Deepfreeze, they provided logistic support for the scientific research programs that were being conducted by 70 American universities, government

agencies, and industrial firms. The return of NMCB SEVENTY-ONE from Antarctica in 1974 marked the end of Seabee participation in Operation Deepfreeze. The National Science Foundation, which oversaw the program, was to accomplish all remaining construction by contract.

In addition to the work performed by the NMCBs, the PHIBCBs were extensively employed. Both were engaged primarily with fleet exercises and other training operations. Additionally, amphibious Seabees in the Pacific Fleet found time to accomplish earthwork for a canoe lagoon and a camping area at Imperial Beach, California, to place and remove concrete obstacles in South Bay for underwater demolition teams and Sealab training, and to complete the first increment of a sheet pile bulkhead project. Meanwhile, Seabees of the Atlantic Fleet constructed a boat marina at Naval Amphibious Base (NAB) Little Creek.

Furthermore, detachments of the amphibious Seabees served in the Mediterranean and in the Caribbean. These detachments were of the amphibious ready groups that were prepared for amphibious assaults whenever necessary.

In June 1969, the first Seabee team to be employed by the Trust Territory of the Pacific Islands landed at Moen Island in the Truk District. While the concept of civic action was not new to the Seabees, the Micronesian environment was totally different from that of Thailand and Vietnam, where the thirteen-man Seabee teams had proved so successful.

The Trust Territory was a United Nations strategic trust administered by the United States under a 1947 agreement. While the area was not war-torn or threatened, as was the case in Vietnam and Thailand, the Trust Territory was in an embryonic stage of political and economic development.

Under an agreement between the secretaries of the Interior and Defense and at the specific request of the native people at each location, Seabee teams were provided to assist the Micronesians in constructing facilities, roads, and utilities required to enhance the economic development and conditions of health in the Trust Territory. While construction of such facilities provided tangible evidence of Seabee accomplishments in Micronesia, the major emphasis and greatest potential benefit were the valuable training in construction skills made available to the people of Micronesia. This training enabled them to accomplish essential construction themselves.

Seabee teams in the Trust Territory served on the islands of Ponape, Truk, Palau, Kusaie, and Yap. Throughout the 1970s and into the 1980s, the teams built roads, dispensaries, water tanks, bridges, and public buildings. The response of the Micronesian people to the civic action program was highly favorable in all districts. The tangible benefits were readily apparent in the improved roads, utilities, and new facilities.

In the summer of 1972, a Seabee team, with assistance from a PHIBCB, assembled an Ammi-pontoon hospital barge on Lake Titicaca high in the central plateau of Bolivia. The project was sponsored by the Bolivian Navy with assistance from the U.S. government. The barge was a 90-foot Ammi-pontoon with a prefabricated Lewis building superstructure that served as a dispensary. It was powered by two diesel outboard motors and contained all the basic medical and dental facilities of a small hospital.

In the mid-1960s, increased interest in exploitation of the ocean for defense purposes spotlighted a need to establish an underwater construction capability within the Navy. A team of Seabee divers was formed during 1968 to launch, implant, and recover the Tektite I habitat in the Caribbean Sea. The success of this operation led to additional

Seabee underwater construction assignments. It also led to the establishment of two Seabee Underwater Construction Teams (UCTs): UCT ONE under the cognizance of the TWENTY-FIRST NCR at Davisville, Rhode Island, and UCT TWO under the cognizance of the THIRTY-FIRST NCR at Port Hueneme, California.

After their formation, both teams performed successfully in numerous operations. Some of the operations included the installation, maintenance, and repair of submarine cables and pipelines. They also implanted and recovered moorings, acoustic and magnetic systems; conducted underwater surveys; and performed harbor and dry dock inspections. The teams demonstrated a capability to perform and added a new dimension to the NCF, previously generally restricted to efforts on land.

In 1970, the CNO, had a concern for improving the quality of life ashore for the Sailor and their family, established a new program of improving shore establishment habitability. The Seabees were committed to lead and direct the Self-Help and Shore Establishment Habitability Improvement Programs.

Under these programs active and reserve fleet Seabees and construction battalion units participated in improvements to personnel support facilities. The construction battalion units consisted of approximately forty or fifty men and were established to provide more effective and worthwhile duty for Seabees while stationed ashore. In addition to training on construction projects and continuing the Seabees' combat and disaster recovery readiness, the units guided and supervised the efforts of other Navy ratings in improving the Sailor's living conditions ashore under the self-help concept.

Examples of the projects to improve living conditions ashore ranged from very simple structures, to large bus shelters, to large hobby shop complexes. Other typical examples included improvements to living facilities, temporary lodging, parking garages, on-base parking, mobile home parks, locker clubs, and recreation clubs. In 1981, 16 construction battalion units were actively engaged in executing such projects in the United States.

In addition to performing their regular construction mission, Seabees participated in humanitarian and disaster recovery assignments in the wake of several natural disasters during the 1970s and early 1980s. In January 1975, a Seabee salvage team was sent to Managua, Nicaragua, following a major earthquake that heavily damaged that city. After completing its primary mission of salvage at the U.S. embassy, the team then salvaged badly needed hospital equipment for the El Ritiro Hospital in Managua. In December 1975, Seabees of Construction Battalion Unit 417 engaged in flood control operations at Mt. Vernon, Washington, when the Skagit River overflowed its banks and threatened the town. With the collapse of RVN in 1975, Seabees also provided support to the Vietnamese refugee program, Project New Life, by building a tent-city on Guam for 50,000 refugees. In February 1976, NMCB FORTY sent a detachment to Guatemala City, Guatemala, to provide disaster relief following an earthquake that caused extensive damage to that city. In May 1977, NMCB THREE performed recovery and reconstruction work of all types on Guam in the wake of Typhoon Pamela. In February 1980, Seabees from the THIRTY-FIRST NCR at the Construction Batallion Center (CBC), Port Hueneme, California, battled a devastating flood at the Pacific Missile Test Center, Point Mugu, California. Seabees went to the islands of Jamaica and Dominica in 1980 to help repair the extensive damage caused by Hurricane David in December 1979.

During 1981, Seabees based at the CBC Port Hueneme, California, performed a construction task of some interest. They constructed military and Secret Service support facilities at President Ronald Reagan's ranch near Santa Barbara, California. During a

subsequent “thank you” barbecue for the men involved, President Reagan was made an honorary Seabee.

With the pressure to reduce the size of the Armed Forces after the Vietnam War, it became necessary to place greater reliance on the reserve force to offset the reduction in the active force. During the 1970s, reserve Seabees experienced a closer association with their active counterparts than in the past.

Efforts were made to elevate the readiness posture of the reserve Seabee force through a variety of programs. Through innovative techniques, new procedures were implemented within the reserve force. One such program involved the establishment of permanent drill sites for the reserve battalions at military installations within their respective geographical areas. At these sites were positioned readiness support allowances. These allowances consisted of essentially a 10 percent cross section of the TOA for a Seabee battalion. This allowed the reserve battalions to develop year-round training programs. To effectively care for and use this readiness allowance, active duty support personnel were provided to each of the reserve battalions. The mobilization readiness level of the reserve NCF was improved substantially by the middle of the 1970s.

In late 1973, as part of the Navy’s efforts to realign the naval shore establishment, the mission of the U.S. CBC at Davisville, Rhode Island, was revised. The center was reduced to providing storage and preservation facilities for advance base and mobilization stocks, and to providing mobilization facilities to support the NCF. At the peak of the Vietnam War, the Davisville Center supported ten full-strength battalions. However, by 1973, the center was homeport for only three battalions of peacetime strength and one UCT. In addition, the TWENTY-FIRST NCR was located there. On 30 June 1974, NMCB SEVENTY-ONE was transferred to the CBC at Gulfport, Mississippi; NMCB FORTY was transferred to CBC Port Hueneme, California, and UCT ONE was transferred to NAB Little Creek, Virginia. Later in the year, on 27 November, NMCB ONE was also transferred to CBC Gulfport, Mississippi. The last unit of the NCF at Davisville was the TWENTY-FIRST NCR. The regiment was disestablished there on 15 January 1975.

Because the United States was faced with continuing threats to its national security during the 1970s and early 1980s, the Nation had to continue to provide timely and responsible support to the operating forces of the Navy. This meant that the United States had to make the most efficient use of its defense resources. In this context, the Seabees faced, and continue to face, imposing challenges equal to and greater than those faced in World War II, Korea, and Southeast Asia.

1.12.0 Operation Desert Shield/Desert Storm

On 2 August 1990, the armed forces of Iraq began the invasion and subsequent conquest of the Emirate of Kuwait. Under United Nations auspices, the United States and other member nations responded by deploying military forces to Saudi Arabia. The immediate goal was to forestall further Iraqi aggression; the long-range goal was to compel Iraq to withdraw from Kuwait. The initial allied military undertaking to protect Saudi Arabia was dubbed Operation DESERT SHIELD.

Among the US forces deployed to the region was the FIRST MEF. Seabees were to provide construction support for this force. On 7 August, the Seabees began preparations to deploy four battalions to the region: NMCBs FOUR, FIVE, SEVEN, and FORTY. On 13 August the first Seabees arrived in Saudi Arabia, an element of PHIBCB

ONE, comprising 210 personnel. These men immediately went to work unloading Marine Corps equipment and supplies from MPF ships.

Upon their arrival in Saudi Arabia, the Seabees built critically needed facilities at the four airfields where a Marine air combat element had deployed. This entailed construction of parking aprons, as well as base camps to house the Marines pouring into the area. Next, the Seabees built ammunition supply points for the large amounts of ordnance being transported to the region. Once these needs were met, the Seabees shifted emphasis to improving living conditions in the Marine camps.

Among major projects completed during Operation DESERT SHIELD was an HQ complex for the FIRST MEF and a 15,000-man camp for the SECOND MEF. The latter project was the largest wartime multi-battalion Seabee project since the Vietnam War. NMCBs ONE, FOUR, FIVE (project lead), SEVEN, TWENTY-FOUR, FORTY, and SEVENTY-FOUR worked on the project. Construction began in late November. The camp comprised of six modules, each capable of housing 2,500 people. Each module contained berthing, office space, showers, toilet facilities, a galley, roads, and parking areas. The completed camp complex was dubbed “Wally World.”

Operation DESERT STORM, the expulsion of Iraqi forces from Kuwait, began in early 1991. On 16 January 1991, the Allies initiated a massive air campaign against Iraq. Before it was over, allied aircraft flew more than 40,000 sorties against Iraqi targets. At this time, planning went forward for the THIRD NCR to move into Kuwait in the wake of advancing allied forces, to open roads and airfields and provide immediate battle-damage repair.

In January 1991, the Marines began to move north in preparation for the expected ground assault on the Iraqis. In support of this, the Seabees began to concentrate on building and maintaining roads to serve as the main supply routes throughout northern Saudi Arabia.

The Gulf War demonstrated the ability of the NCF, both active and reserve, to meet the exigencies of a large-scale military operation. Not all of the action, however, was in the Persian Gulf. Approximately 60 percent of the Seabee reserve units called to active duty were sent to other parts of the world to replace active-duty units sent to the Gulf early in the conflict.

1.13.0 Seabees in Bosnia

Throughout 1995, the Second Naval Construction Brigade maintained a high state of alert for potential Seabee involvement in Bosnia. As part of the relief operations in the former Yugoslavian republics, it provided an officer to augment the United Nations High Commissioner for Refugees staff. This officer functioned as engineering and infrastructure officer and served in a strictly nonmilitary capacity, assisting humanitarian relief operations.

In support of Joint Task Force (JTF) Provide Promise, in March 1995, a 35-person team from NMCB THREE successfully brought to a close the Navy’s turn at providing public works maintenance and operations functions at the Joint Fleet Hospital in Zagreb, Croatia.

In October of that same year, the brigade sent a staff officer to the HQ of Allied Forces, South, in Naples, Italy, to help finalize the North Atlantic Treaty Organization operations plan for Bosnia. Liaison officers from NMCB ONE THIRTY-THREE were dispatched to the 26th Marine Expeditionary Unit (MEU) aboard the U.S. Ship (USS) *Wasp* and to several locations in Bosnia, Croatia, Hungary, and Germany.

At the start of 1996, a 170-person detail from NMCB ONE THIRTY-THREE was deployed at the Sava River crossing at Zupanja, Croatia, constructing the first and highest priority tent camp of the entire Joint Endeavor Implementation Force operation. This deployment, which began in December 1995, was the first deployment of Seabees utilizing the Air Force's C-17 aircraft. After expending 14,900 man-days constructing five tent camps and numerous sustainment projects, the detail redeployed to Rota, Spain, on 2 March 1996. The Second Naval Construction Brigade maintained a high state of alert for potential Seabee involvement in the disestablishment of many of these tent camps.

In September 1996, NMCB FORTY continued the mission in Bosnia. A total of 334 personnel with 226 pieces of Civil Engineering Support Equipment (CESE) deployed to Bosnia on 21 September to disestablish fourteen base camps and complete nineteen force sustainment projects, expending 9,600 man-days in the effort.

NMCB FORTY was midway through a seven-month deployment to Camp Mitchell in Rota, Spain, when it was ordered to Bosnia. The above-cited CESE equipment and an additional 100 shipping containers were transported aboard the USS *Wilson* to Livorno, Italy. From Livorno the battalion moved via seven trains to an intermediate staging base at Taszar, Hungary. From there, the battalion moved in four road convoys, escorted by military police, through Croatia, and down to Colt Base in Bosnia. NMCB FORTY accomplished the entire move in three weeks from the time orders were received. In Bosnia, NMCB FORTY was under the orders of the Task Force (TF) Eagle Engineering Division. The battalion ultimately employed more than 400 Seabees in the U.S.-led Multinational Division North to tear down base camps as part of a withdrawal of U.S. Army troops from the region. Aside from disestablishment operations, the battalion was tasked with a variety of collateral projects, including road maintenance on Main Supply Routes (MSRs) and snow and ice removal. Additionally, the battalion built a bypass road and a container laydown area in Bosnia, and an ammunition handling area in Croatia. Finally, with the deployment of the U.S. 1st Infantry Division to the theater, NMCB FORTY was tasked to prepare for sustainment engineering projects at two base camps that were to remain as consolidation sites in the area.

1.14.0 Seabees in Iraq

Seabees supporting the I Marine Expeditionary Force (MEF) were among the first U.S. forces on the ground to support U.S. efforts in Iraq. With approximately 3,000 Seabees in theater, they had the largest Navy role ashore during Operation Iraqi Freedom. Before hostilities, Seabees constructed a 20-acre airfield parking apron, prepared 10-acre and 20-acre areas for AM-2 matting, and constructed two munitions storage areas, a 48,000-square foot concrete pad, and a 1,200-person camp in Kuwait. When hostilities began, Seabees maintained 11 breach lanes as the Marine Corps crossed the line of departure and entered Iraq. Seabees erected bridges over the Diyala River and Saddam Canal in spans ranging from 40 to 60 meters. They repaired and constructed various roads to provide the Marine Corps with effective paths to move northward, as seen in *Figure 1-3*. Seabees also constructed a 14,400-person prison camp that covered 42 acres. Seabees performed work at the port of Umm Qasr, including port clearing, engineering assessments, and port opening in preparation for humanitarian aid. Seabees built the 5,000-person facility Camp Patriot at the Kuwaiti Naval Base including building an elevated causeway to offload supplies.

Seabees also renovated schools and municipal facilities to help the Iraqi people. This included 7 bridges, 74 schools, 13 government buildings, and 16 police and fire stations. They also completed 20 utility restoration projects, including the Al Hillah Water Irrigation Facility for irrigating 125,000 acres of farmland.



Figure 1-3 — Seabees repairing a road in Iraq.

During Operation Iraqi Freedom II, approximately 1,100 Seabees deployed to Iraq to provide humanitarian assistance to the Iraqi people and to provide force protection construction for U.S. forces. Seabees negotiated 300 projects valued at over $100 million in contracts in Al Anbar to improve education, sanitation, transportation, water and sewer, primary care clinics, courthouses, police stations, and Iraqi security facilities.

During Operation AL FAJR (battle of Fallujah), Seabees provided nontraditional direct combat support to the MEF. In preparation for the invasion, Seabees played a key role by securing electrical service to the city. During the battle, two task-organized engineer assessment teams performed critical infrastructure assessments and advised Marine regimental combat team commanders on engineer-related matters regarding replacement time and cost to utility systems, with the goal of supporting the timely reoccupation by Iraqi civilian operators. The Seabee teams also led reconstruction efforts and assumed the role of Fallujah public works during the absence of Iraqi municipal employees.

Seabees in Iraq at the time of this publication are providing force protection and habitability improvements for Forward Operating Bases (FOBs) in support of coalition forces, including construction of hardened dining facilities, force protection barriers, temporary berthing structures, tension fabric structures for storage facilities, wastewater treatment ponds, upgrades to existing electrical systems, and runway repairs.

They are also constructing operating bases for Iraqi civil defense forces and border patrol units, and providing assessments of roads, bridges, and facilities to support the Marines.

1.15.0 Seabees in Afghanistan

In the aftermath of September 11, 2001, approximately 450 Seabees began prepping to launch a mission in support of Operation Enduring Freedom. TF FIFTY-EIGHT, supported by a Seabee detachment from NMCB ONE THIRTY-THREE, was establishing a FOB in Afghanistan to build up combat power and subsequently conduct combat operations against the Taliban regime and Al-Qaeda forces. The mission was contingency construction such as repairing and maintaining a dirt runway at FOB Rhino, then moving to Kandahar to perform Rapid Runway Repair (RRR) at the coalition-bombed international airport.

As the focus of effort began to shift from Rhino to Kandahar, additional personnel and equipment were moved in as needed. Seabees repaired crater damage from coalition bombing and got the runway open for C-130 and C-17 flights within 48 hours with temporary, compacted-earth expedient repairs. They also built a short-term holding facility to house Taliban and Al-Qaeda detainees. They were then tasked with improving temporary to permanent runway repairs so that other types of aircraft, including the C-141 needed to transport detainees from Afghanistan to Guantanamo Bay, Cuba, would be able to use the airfield at Kandahar.

Seabees also deployed to Basilan in the Philippines to support counterterrorism efforts there. Seabees built roads, bridges, and water-wells, and repaired ports and airstrips to allow access to isolated areas where the Abu Sayyaf terrorist group was trying to gain a foothold.

1.16.0 Major Humanitarian Efforts

1.16.1 Hurricane Ivan

More than 250 Seabees from NMCBs ONE and NMCB SEVENTY-FOUR deployed to Navy installations in Pensacola, Florida, to assist in recovery operations following Hurricane Ivan, which struck on 16 September 2004. The Seabees cleared roads, established emergency generator power, erected a fleet hospital surgical unit suite; developed temporary landfills to accommodate debris caused by the hurricane, and assessed damage to base facilities. In Guam, Seabees from NMCB Seven helped the local population in recovery efforts in the aftermath of Typhoon Nanmadol, which ravaged the island in December 2004.

1.16.2 Tsunami Recovery

Seabees from NMCBs SEVEN and FORTY and UCT TWO responded to the December 2004 tsunami in the Indian Ocean near Sumatra. NMCB SEVEN also deployed an Air Detachment (AIRDET) of 100 Seabees to Sri Lanka. They removed more than 1,300 cubic yards of debris from schools, demolished nine unsafe buildings, and distributed 28,000 gallons of water to internally displaced persons camps. NMCB FORTY deployed 49 Seabees onboard the landing ship dock USS *Fort Mchenry* to Indonesia. They conducted assessments of 32 government facilities and two airfields and directed the construction of three tension fabric structures and beach-clearing operations. UCT TWO deployed a construction diving detachment of 15 Seabees to Thailand and performed waterfront engineering assessments of key facilities.

1.16.3 Pakistan Earthquake

In October 2005, 125 Seabees from NMCB SEVENTY-FOUR deployed to Pakistan following a devastating 7.6-magnitude earthquake near Muzzafarabad. Forty Seabees from NMCB Four relieved NMCB SEVENTY-FOUR personnel in December. In support of the Disaster Assistance Center—Pakistan, Seabees provided general construction support; engineering assessments; construction of temporary shelters, schools, and sea huts; road clearing and debris removal; water and utility line repairs; and construction/camp maintenance for the 212th Mobile Army Surgical Hospital unit.

1.16.4 Hurricane Katrina Recovery

After Hurricane Katrina struck the U.S. Gulf Coast on 29 August 2005, more than 3,300 Navy Seabees responded directly in recovery operations. They included Seabees from TWENTY-SECOND NCR; Twentieth Seabee Readiness Group (SRG); NMCBs ONE, FOUR, SEVEN, EIGHTEEN, FORTY, and ONE THIRTY-THREE, TWO ZERO TWO, and THREE ZERO THREE; UCT ONE; and PHIBCB TWO. Seabees cleared 750 miles and assessed 2,695 miles of roads. They removed more than 20,000 tons of debris and supported search and rescue operations. Seabees repaired 85 schools affecting 47,208 students and repaired and constructed more than 30 temporary public buildings. They also delivered 237,000 gallons of water and fuel and distributed food to 1,600 families each day. They completed 455 water, sewer, and electrical repairs. UCTs also repaired and inspected piers.

Seabees (who themselves were victims—some of whom lost everything) were also helping out their shipmates and fellow community members through very rough times. NMCB ONE was just returning to Gulfport, Mississippi from deployment in Southwest Asia and Europe as Katrina was hitting land. A planeload of those Seabees were forced to land in Atlanta, Georgia and rest overnight, waiting for Katrina’s wrath to pass. Many

of those Seabees made their way via bus to Gulfport to survey their own losses and help their shipmates. NMCB FIVE of Port Hueneme, California, was delayed in returning home from Iraq and Guam for 30 days to allow Gulfport-based NMCB ONE THIRTY-THREE'S personnel more time to recover before their deployment to Iraq and Guam.

Members of NMCB SEVEN worked with crewmembers from the USS *Whidbey Island* and the Mexican amphibious ship MS Papaloapan to clean up local schools in the Biloxi area. Less than a month after Katrina devastated the Gulf Coast regions, Seabees from NMCB FORTY were called into action when Plaquemines Parish experienced rising waters from Hurricane Rita, threatening a levee. The Seabees worked with local residents and the Air National Guard to fill and place sandbags along a 150-foot section to protect the community.

Reserve Seabees from NMCB EIGHTEEN (based in Washington State) worked side by side with their active duty counterparts during hurricane relief efforts. They began working at NAS Meridian, Mississippi, where 1,000 evacuees from the Gulfport area were transferred to an on-base shelter. They manned the shelter's welcome center and cleared massive amounts of debris on the base and surrounding roads.

NMCB FORTY built a 500-person tent city in September for Federal Emergency Management Agency (FEMA) officials in Plaquemine Parish so the officials could relocate from temporary accommodations at Belle Chasse Primary School. The tent city, which included air-conditioned tents, showers, and a 40- by 60-foot dining facility, allowed FEMA to conduct their day-to-day operations while Belle Chasse Primary School concentrated on getting their students back in class.

Seabees built another tent city in Pass Christian, Mississippi, to house 1,000 people rendered homeless by the impact of Hurricane Katrina. Approximately 250 Seabees from detachments across the United States gathered behind the city's War Memorial Park, where they constructed a temporary police department HQ and other municipal offices as government leaders organized plans to rebuild the town.

Seabees from NMCB FORTY and local Plaquemine Parish residents teamed up to help FEMA expedite establishing housing for hundreds of Hurricane Katrina evacuees. Seabees installed water, sewage, and electrical connections for trailers made available for use by local families as temporary housing.

The CBMU TWO ZERO TWO, Key West Detachment secured and cleaned up the 11-story Armed Forces Retirement Home in Biloxi, Mississippi, which was home to 400 retired military personnel. The facility was evacuated because the lower level was flooded during the storm.

2.0.0 CONCEPT OF ORGANIZATION AND CHAIN OF COMMAND OF THE NCF

The Secretary of Defense Memorandum Global Force Management Implementation Guidance FY 2008–2009 assigns Navy operating forces to each of the Geographic Combat Commanders (GCCs). A force assigned to a GCC may be transferred from that command only as directed by the Secretary of Defense (SecDef) and under procedures prescribed by the SecDef and approved by the President of the United States (POTUS). The Navy has established multiple component Headquarters (HQs) to support the unified combatant commands.

Two parallel chains of command exist within the Navy: service and operational.

1. The Service chain of command goes from POTUS to the SecDef, the Secretary of the Navy (SECNAV), and the Chief of Naval Operations (CNO).
2. The operational chain of command goes from POTUS, through the SecDef, directly to the Combatant Commanders (CCDRs) for missions and forces assigned to their commands. NCCs provide operational forces to GCCs and other operational commanders.

The NCF consists of two functional components:

1. FIRST Naval Construction Division (1NCD)/Naval Construction Forces Command (NCFC), see *Figure 1-4.*
2. Naval Amphibious Construction Battalions (PHIBCBs) of the Naval Beach Group (NBG) which is discussed later in this section.

2.1.0 Mission of the Naval Construction Force

"With compassion for others, we build; we fight, for peace with freedom." —Admiral Ben Morell. The NCF's mission is to conduct contingency engineering and expeditionary construction operations across the ROMO. In carrying out this mission, the NCF performs the following tasks:

- Provides responsive military construction support to the operating forces of the United States, including operational, logistics, underwater, and ship-to-shore facilities construction, maintenance, and operation. This includes engineer reconnaissance, Battle Damage Repair (BDR), vertical and horizontal construction, construction and maintenance of advance base facilities, power generation and electrical distribution systems, water treatment and distribution systems, wastewater treatment and collection systems, and contingency public works support. Refer to Navy Warfare Publication (NWP) 4-04, *Naval Civil Engineering Operations*, for a comprehensive list of NCF capabilities.
- Provides responsive military logistics support to the operating forces of the United States and its allies by enabling and conducting ship-to-shore movement of wet and dry cargos. Refer to NTTP 3-02.1M/ MCWP 3-31.5, *Ship to Shore Movement*, and NTRP 3-02.1.2, *Naval Beach Group Support Element Operations*, for additional information on the amphibious construction battalion (ACB or PHIBCB) and its role in this mission.
- Provides military and amphibious tactical and sustainment construction support to Navy, Marine Corps, and other forces in military operations, subsequent Combat Service Support (CSS) ashore, and defense against overt or clandestine adversary operations directed toward personnel, camps, and facilities under construction.
- Provides CS and CM, including furnishing assistance to civilian agencies under conditions of emergency or catastrophe caused by adversarial action or natural causes.

NOTE

NCF response in the Continental United States (CONUS) is coordinated with the Federal Emergency Management Agency (FEMA) and/or with local or state agencies through the military chain of command.

- Provides forces for Foreign Humanitarian Assistance (FHA) and Humanitarian Civic Action (HCA) operations.

2.2.0 First Naval Construction Division (1NCD)

1NCD is the U.S. Navy's global force manager for the NCF, except PHIBCBs. 1NCD is a commissioned, operational shore-based command headquartered at Joint Expeditionary Base Little Creek-Fort Story, Virginia, with an integrated AC and RC staff.

As a permanently organized command, 1NCD/Naval Construction Forces Command (NCFC) (*Figure 1-4*) provides expeditionary combat construction forces to fulfill operational and forward engagement requirements of the GCCs and joint task force (JTF) and component commanders; to conduct contingency and CAP in support of Operation Plans (OPLAN), theater security cooperation plans, and contingencies; to provide contributory engineering support to naval shore activities; and to exercise Command and Control (C2) over NCRs and SRGs by providing planning, training, policy, and resources to organize, train, operate, and maintain Seabee units. 1NCD does not have dedicated direct labor assets that reside in its subordinate units.

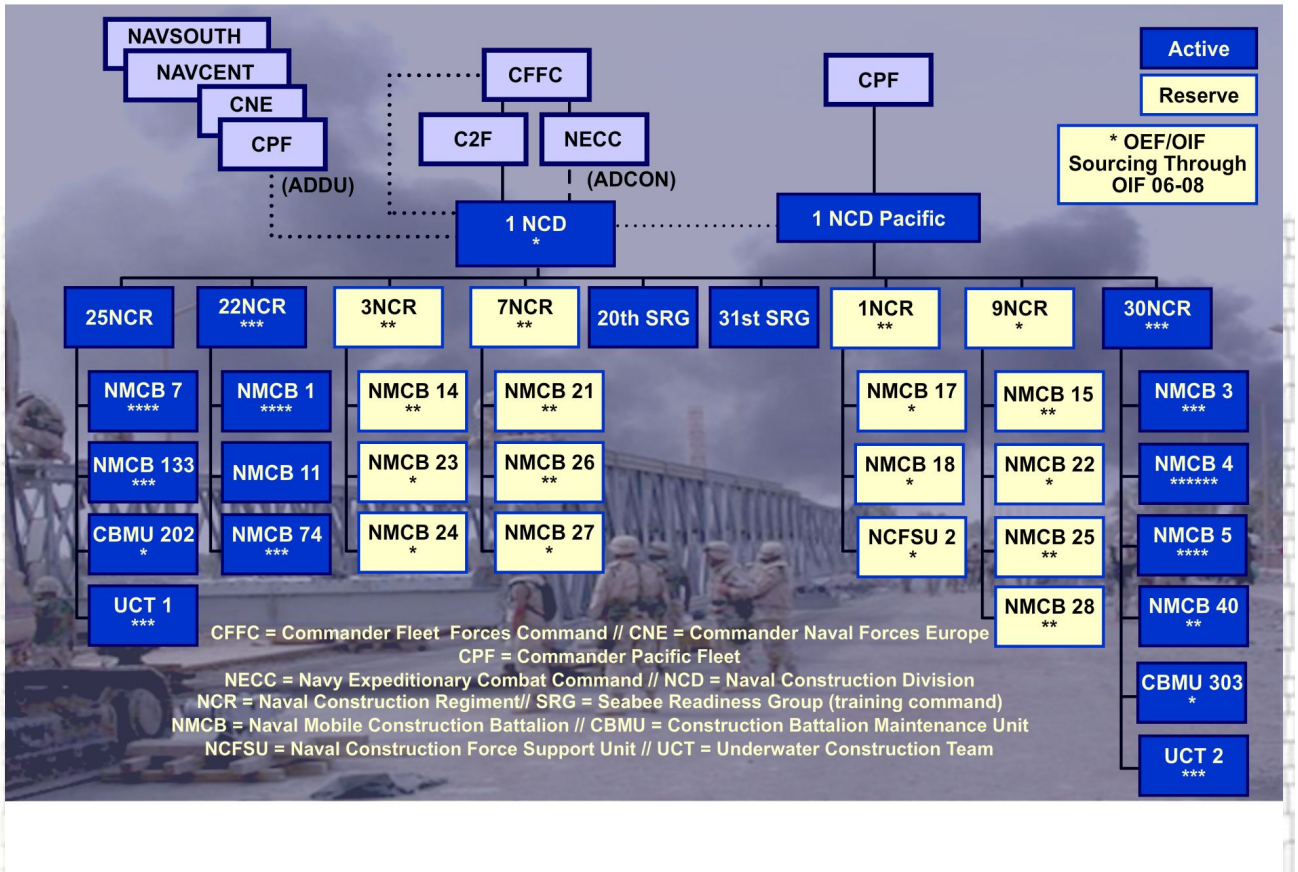


Figure 1-4 – 1NCD chain of command.

2.2.1 Naval Construction Regiments (NCRs)

Seven NCRs (*Figure 1-5*) are organized under 1NCD as operational commands. Two AC NCRs, TWENTY-SECOND and TWENTY-FIFTH NCRs, are located at CBC Gulfport, Mississippi; and one AC NCR, THIRTEENTH NCR, is located at Naval Base Ventura County (NBVC) Port Hueneme, California. There are four RC NCRs with readiness support sites (RSS) spread across CONUS.

1. FIRST NCR is headquartered at NBVC Port Hueneme, California.
2. THIRD NCR is headquartered at Navy and Marine Corps Reserve Readiness Center Marietta, Georgia.
3. SEVENTH NCR is headquartered at Naval station (NAVSTA) Newport, Rhode Island.
4. NINTH NCR is headquartered at Naval Air Station (NAS) Joint Reserve Base (JRB) Fort Worth, Texas.

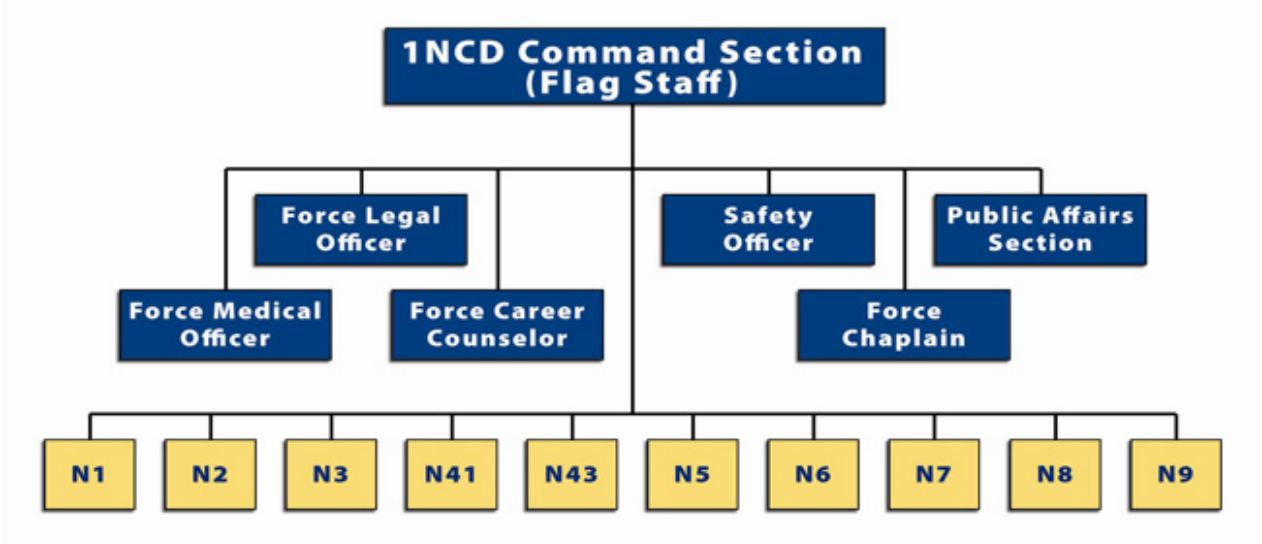


Figure 1-5 — 1NCD NCRs.

The NCR (*Figure 1-6*) is an independent, permanently structured CE that conducts construction and engineer project management operations. The NCR provides C2 over assigned subordinate engineer and other expeditionary units when deployed to an assigned geographical area mission. The NCR (CE) does not have dedicated direct labor assets; these assets reside in its subordinate units. The NCR deploys as an independent unit, usually functioning as a CE of a Naval Construction Element (NCE) with multiple assigned NCF units. The NCRs assigned task organization may include other Navy expeditionary units or detachments, and units from other Services or Host Nations (HNs).

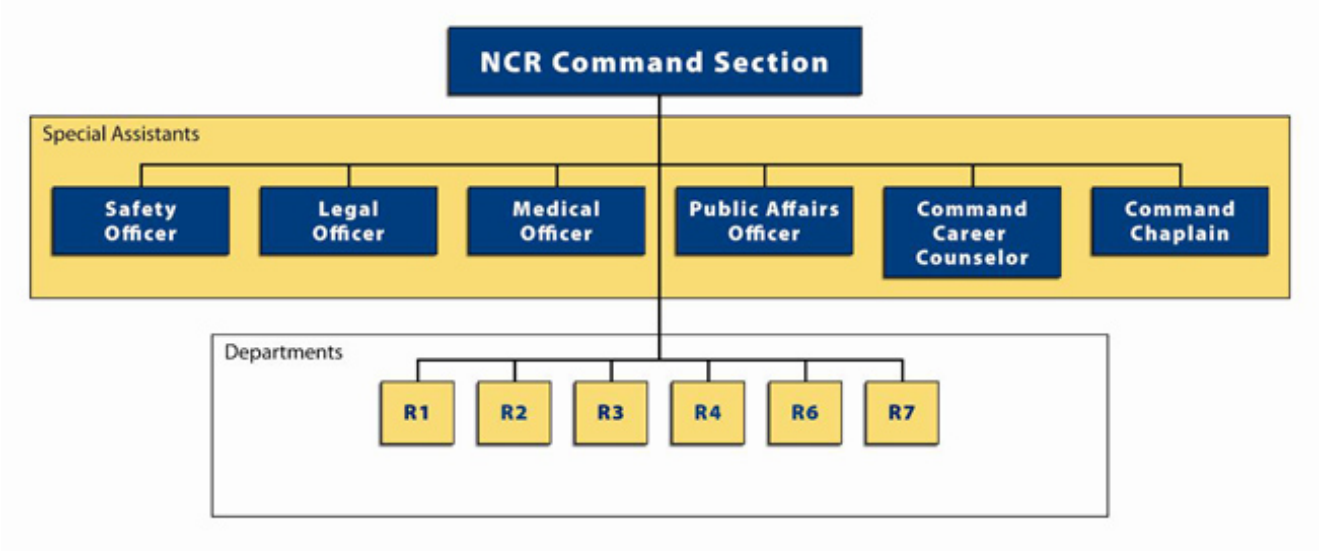


Figure 1-6 — Naval construction regiment organization.

The NCR provides sustained general engineering and construction program management beyond the organic capabilities of supported units. The size and concept of employment of a deployed NCR can vary depending on the requirements of the mission. The NCR deploys during exercises, contingency, or major combat operations. The NCR and its subordinate units deploy as whole integral units or as task-organized detachments. Units and detachments task-organize with warfighting-capable or engineer-mission-only capabilities.

An NCR deploys and employs not only its own units, but also units from other NCRs and SRGs, as well as units from other Navy expeditionary forces, reserves, and other Services as required. The NCR is capable of independent employment but may be a satellite on the HQ of one of its supported units. It is capable of supporting up to an Army Corps or MEF-sized mission across the Range of Military Operations (ROMO). The NCR may function as the CE of an NCE.

2.2.2 Seabee Readiness Group (SRG)

Two SRGs are organized under 1NCD, primarily as training commands. The TWENTIETH SRG is located at CBC Gulfport, Mississippi and the THIRTY-FIRST SRG is located at NBVC Port Hueneme, California. SRG instructors work under 1NCDs training philosophy and policy to conduct realistic, aggressive, and safe training, providing continuity and consistency in the continuum of training and mentoring of Seabees.

The SRG (*Figure 1-7*) provides combat-ready NCF units ready for tasking in support of the GCCs. The SRG provides those units under its ADCON, with the training, equipment, maintenance, and logistical support as required to achieve their assigned NMETs and the associated capabilities contained in their ROCs in preparation for deployment in support of an NCC, Joint Force Commander (JFC), or Marine Air-Ground Task Force (MAGTF).

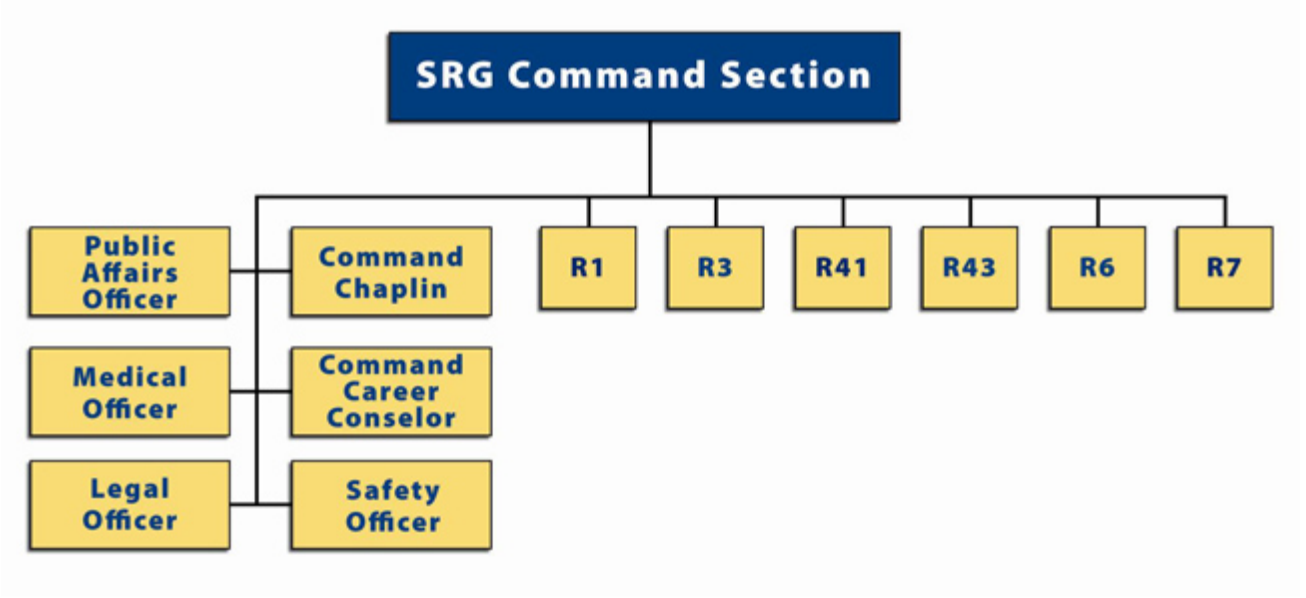


Figure 1-7 — SRG command section.

The SRG provides technical and military instruction and unit logistical support beyond the organic capabilities of supported units. The SRG staff sections and departments are aligned with the 1NCD organization and function in a supporting role to the 1NCD HQ staff.

The SRG directly coordinates planning, resource allocation, and training program execution with assigned NCF units. Training includes instruction in individual and team combat skills, with specialized technical construction skills through unit-level Field Exercise (FEX) training events. The SRG master scheduler reviews unit skill inventories, schedules, and training pipelines, and communicates directly with units to identify training deficiencies and to provide program support. SRG Mobile Training Teams (MTTs) support AC and RC unit training by traveling to subordinate unit locations to conduct training when economically feasible.

2.2.3 Naval Mobile Construction Battalions (NMCB)

The NMCBs are primarily designed for construction and military support operations to build advance base facilities in support of the Armed Forces. *Figure 1-8* shows the basic NMCB organization. The function of an NMCB also includes projects of repair and operation of facilities and lines of communications during emergencies or under conditions that demand immediate action. When fully outfitted, NMCBs are self-sufficient units for 90 days and require replenishment of consumable items only. They can defend themselves for a limited time; communicate internally; provide messing and billeting facilities; and perform the necessary administrative, personnel, medical, dental supply, and chaplain functions. The NMCBs also participate in disaster recovery operations during both natural and man-made disasters.

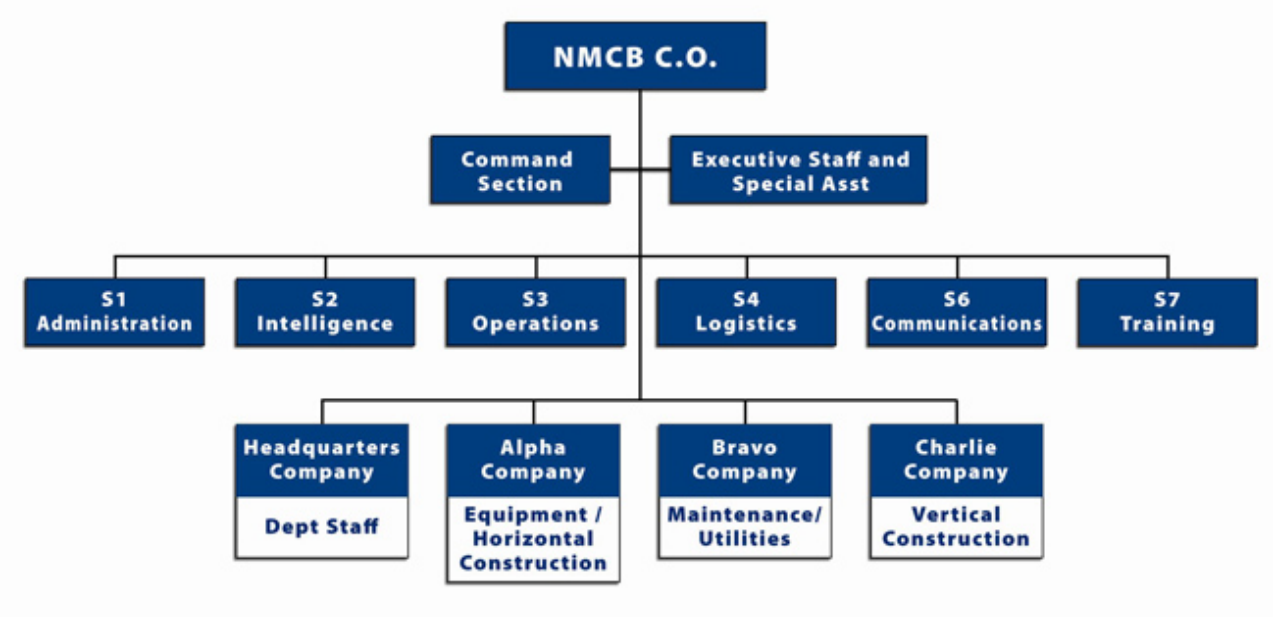


Figure 1-8 —NMCB Main-Body Organization.

Each battalion subdivision has a construction and military support assignment, and every Sailor fills a construction and military billet. Command channels are the same for both construction and military support, permitting rapid transition from one to the other.

All platoons are organized into work squads that correspond to the weapons/rifle squad organization. Work crews and work squads of construction platoons are also trained as disaster control teams. Each battalion may organize the squads of each platoon to meet its particular needs. The construction/military companies retain their normal letter designation, and the platoons retain their letter-number designation to facilitate reference, planning, and scheduling.

NMCB company commanders do not have Article 15 authority as specified in Title 10, *Uniform Code of Military Justice* (*UCMJ)*. They report administratively to the Executive Officer (XO). The operations officer has functional oversight over the battalion's construction operations; therefore, all company commanders report to the operations officer for operational tasking. NMCB companies are organized similarly to a basic infantry rifle company for military control and accountability, such as muster, instruction, inspection, and physical and general military training.

2.2.3.1 The Headquarters Company

The Headquarters Company of a Seabee battalion serves as the military and administrative organization for the personnel assigned to the executive and special staffs of an NMCB. Headquarters Company has the capability of providing defense in a combat situation as a company unit and, in addition, acts as a reserve force for the battalion. The Headquarters Company's staff, when participating in a defensive situation, consists of the company commander, platoon commanders, a company Chief Petty Officer (CPO), and other administrative assistants as required to organize it into two rifle platoons and one grenadier platoon.

Headquarters Company Commander

Normally assigned to additional duty on the battalion staff, the Headquarters Company commander is responsible for the following:

1. Command of the company in all military formations and operations
2. Assignment of personnel on the watch, quarter, and station bill
3. Personnel muster
4. Supervision and coordination of military and leadership training
5. Administration and guidance in professional and technical training
6. Berthing, messing, mail distribution, and physical fitness
7. Division officer responsibilities, unless separate division officers are assigned

The Headquarters Company commander is also responsible for the security and defense of the battalion's command post and acts as the reserve force commander for the battalion in the defense.

Headquarters Platoon Commanders

All personnel assigned to the battalion's executive and special staffs are administratively assigned to Headquarters Company. Therefore, the headquarters platoon commanders are normally officers of the administration and personnel department, the operations department, and the supply and logistics department. Most battalions will assign a junior officer with a rank of Ensign or Lieutenant Junior Grade.

The platoon commander is responsible for training, discipline, control, and tactical deployment of the platoon. The platoon commander carries out the orders of the company commander and controls the platoon through squad leaders. In combat, the platoon commander is positioned where they can readily control their squad leaders. At the same time, they are in contact with the company commander. Platoon commanders are generally linked with the company commander by radio, field telephone or both.

Headquarters Company Chief Petty Officer

The Headquarters Company CPO can be a chief petty officer or a senior chief petty officer, and serves as an assistant to the Headquarters Company commander in a staff capacity. The Headquarters Company CPO is directly responsible to the company commander for the administration and efficient operation of the company. The company CPO is also responsible for the discipline, training, and performance of the men assigned to the company and is armed with the service pistol.

2.2.3.2 The Rifle Company Headquarters

The rifle company headquarters of a Seabee company consists of the company commander, an assistant company commander (when assigned), the company chief, a company guidon, a company clerk, a company messenger, and other administrative assistants as required. The rifle company headquarters varies somewhat in each company, depending on its construction/combat missions.

Rifle Company Commander

The rifle company commander is usually a lieutenant in the CEC who is responsible for commanding their company by following the policies of the CO.

Assistant Rifle Company Commander

The assistant rifle company commander, when assigned, may be a junior CEC officer or a senior enlisted. The assistant rifle company commander is normally placed in a position of line authority and responsibility between the company commander and the platoon commanders. As a personnel and material manager within the company, they are concerned with executing and enforcing the policies of the company commander and the commanding officer. The assistant rifle company commander supervises the administration of the company; plans and gives technical support to the platoon commanders about their crew assignments, project planning and scheduling, safety, and training. The assistant rifle company commander is armed with the service pistol.

Rifle Company Chief

The rifle company chief is the senior enlisted Sailor assigned to the company, usually a senior chief petty officer or a master chief petty officer. The rifle company chief is the primary administrative assistant and technical advisor to the company commander. The rifle company chief is directly responsible to the company commander for the administration and efficient operation of the company and for the discipline, training, and the performance of the Sailor assigned to the company. The rifle company chief is armed with the service pistol.

Rifle Company Guidon

The rifle company guidon, generally a petty officer first class, acts as a construction expediter and supply coordinator for the company. During combat, they are stationed near the company commander and are responsible for the distribution of ammunition to the platoon guides. The guidon coordinates the ammunition counts following combat to ensure appropriate redistribution. The rifle company guidon is armed with the M16 service rifle.

Rifle Company Clerk

The rifle company clerk is normally a constructionman with clerical experience. Duties consist of preparing company memorandums, typing, filing, and many other administrative tasks. The rifle company clerk is also the company mail orderly. During military operations, they become the company staff communicator and must be familiar with the operation and care of the company communications equipment. In addition, they are trained in proper procedures for transmitting reports and messages. The rifle company clerk may also serve as guidon bearer during parade formation. The rifle company clerk is armed with the M16 service rifle.

Rifle Company Messenger

Generally, a constructionman is assigned to the company headquarters as a rifle company messenger. They primarily perform in this capacity only during military

operations. For work purposes, they are assigned to a work crew/rifle fire team. Although they deliver most of the messages on foot, they are also trained in the operation of communications equipment so they can take over should the rifle company clerk become a casualty. When the company administrative tasks increase, as they do during homeport training periods, the rifle company messenger may assist the rifle company clerk with their duties. The rifle company messenger is armed with the service rifle.

2.2.3.3 The Rifle Platoon Headquarters

The maneuvering elements of a rifle company are the rifle platoons. A Seabee rifle platoon consists of a platoon headquarters and three or more rifle squads. Each rifle squad is composed of three or more work crew/rifle fire teams. The primary combat mission of the rifle company, as well as the rifle platoon, is to repel the enemy assault by fire and close combat.

Each rifle platoon headquarters consists of a platoon commander, platoon petty officer, platoon guide, communicator, and a messenger.

Rifle Platoon Commander

The rifle platoon commander is generally an Ensign or Lieutenant Junior Grade. Normally, they are the project supervisor. They are responsible for the training, discipline, control, and tactical deployment of their platoon. The rifle platoon commander carries out the orders of the company commander and controls their platoon through squad leaders. In combat, the rifle platoon commander is positioned where they can readily control their squad leaders and, at the same time, remain in contact with their company commander. The rifle platoon commander is generally linked with the company commander by either radio or field telephone or both. The rifle platoon commander is armed with the service pistol.

Assistant Rifle Platoon Commander

The assistant rifle platoon commander is generally a chief petty officer. Normally, they are the project supervisor. They are responsible for the training, discipline, control, and tactical deployment of the platoon. The assistant rifle platoon commander carries out the orders of the company commander and controls their platoon through squad leaders. In combat, the rifle platoon commander is positioned where they can readily control their squad leaders and, at the same time, remain in contact with their company commander. The rifle platoon commander is generally linked with the company commander by either radio or field telephone or both. The assistant rifle platoon commander is armed with the service pistol.

Rifle Platoon Petty Officer

The rifle platoon petty officer, generally a first class petty officer, is the next senior person in the platoon and is second in command. As such, they perform all duties assigned by the rifle platoon commander and stand ready to assume command in their absence. On the job, they will assist in project supervision. In combat, they assist in all aspects of supervision and control of the platoon. The rifle platoon petty officer is positioned where they can hear the commands of the rifle platoon commander but far enough away to avoid becoming a casualty should the rifle platoon commander be hit. The rifle platoon petty officer is also armed with the service pistol.

Rifle Platoon Guide

The rifle platoon guide is generally a first class petty officer who performs the administrative functions the rifle platoon commander may direct. They are directly responsible to the rifle platoon commander for the supply and timely resupply of the platoon in combat and often perform a similar task on the jobsite. They also maintain the platoon casualty record. While the platoon is moving in training or in combat operations, the rifle platoon guide helps prevent straggling. The rifle platoon guide is armed with the service rifle.

Rifle Platoon Communicator and Messenger

The rifle platoon communicators and messengers are generally constructionmen; and during normal construction, they are assigned to work a crew/rifle fire team. The rifle platoon communicator and messenger, in combat, provide communications between the rifle company headquarters and the rifle platoon commander and also between the rifle platoon, its squads, and attached units. The rifle platoon communicator uses radio or telephone communication methods, while the rifle platoon messenger generally travels on foot. Both are armed with service rifles.

2.2.3.4 The Rifle Squad

The Seabee rifle squad is composed of a squad leader, three fire teams, and a grenadier. Ideally, the rifle squad will contain three fire teams of four Sailors each, a grenadier, and the squad leader for a total of 14 personnel.

Squad Leader

The squad leader is generally a first class petty officer. They carry out the orders of the platoon commander and are responsible to them for the discipline, appearance, training, control, and conduct of their squad at all times. They must pay particular attention to the care and maintenance of the weapons and equipment of the squad. In combat, they have the important responsibilities of fire discipline, fire control, and maneuvering their squad. They take a position where they can best observe and control the squad and carry out the orders of the platoon commander. They control the squad by voice and visual commands. The squad leader is primarily a leader; therefore, they only fire their own weapon in critical situations. The squad leader is armed with the service rifle.

Grenadier

The grenadier, generally a third class petty officer, carries out the orders of the squad leader and is responsible to them for the effective care, maintenance, and employment of their weapon—the M203 grenade launcher. In combat, the grenadier always moves with (or is close to) the squad leader. Usually, another third class petty officer in the squad is trained to replace the grenadier should the first one become a casualty. On the jobsite, the grenadier has no special authority unless specifically designated.

2.2.3.5 The Rifle Fire Team

The rifle fire team is the basic combat unit of the rifle squad and is formed around the automatic rifle, which is a variation of the M16 service rifle, with the selector lever always turned to fully automatic. The fire team normally consists of four personnel, although it may contain as few as three and as many as seven. The four basic members are the following:

1. Fire team leader
2. Automatic rifleman

3. Rifleman number 1
4. Rifleman number 2

Fire Team Leader

The fire team leader, generally a second class petty officer, carries out the orders of the squad leader and is responsible to them for the effective employment of the fire team. Their primary responsibility is to control the fire team in combat. In addition, they are responsible for the care and condition of the weapons and equipment of the fire team. The fire team leader is positioned where they can best control the fire of the automatic rifles of the team. They usually control their personnel through real and visual communications, since there are normally no radio or telephone communications below the platoon commander's level. Although they are armed with the service rifle, their primary duty as a leader comes first; and they serve as a rifleman only when absolutely necessary. The senior fire team leader serves as assistant squad leader and is prepared to take over the squad in the event that the squad leader becomes a casualty.

Automatic Rifleman

The automatic rifleman, generally a third class petty officer, provides heavy firepower and is the backbone of the fire team. They are responsible to the fire team leader for the effective employment of the automatic rifle as well as its condition and care. The automatic rifleman acts as the fire team leader's assistant and takes over in their absence.

Rifleman Number 1

Rifleman number 1, generally a constructionman, carries extra ammunition for the automatic rifleman. The automatic rifle must be kept in action at all times; if the automatic rifleman becomes a casualty, rifleman number 1 moves up and replaces the automatic rifleman. In addition, rifleman number 1 is armed with the service rifle and acts as a rifleman and a scout. Rifleman number 1 will assist rifleman number 2 in protecting the flank (exposed side) of the fire team.

Rifleman Number 2

Rifleman number 2, a constructionman or an apprentice, serves as a rifleman and protects the flank of the fire team. Rifleman number 2 is point for all team formations and may also serve as a scout. If more than four personnel are assigned to the fire team, the additional personnel have the same general duties as rifleman number 2. All are armed with the service rifle.

2.2.3.6 Machine Gun Squad

The machine gun squad consists of a machine gun squad leader and two four-man machine gun teams. They work together under the supervision of the team/squad leader.

Machine Gun Squad Leader

The machine gun squad leader, generally a first class petty officer, has the same basic duties as the rifle squad leader. In addition, they select and assign exact positions and targets for their machine guns within the area designated by the platoon commander. The machine gun squad leader is armed with the service rifle and also carries binoculars and a compass.

Machine Gun Team

The machine gun team consists of a team leader, a gunner, and two ammunition carriers. This team operates and services the machine gun.

Machine Gun Team Leader

The machine gun team leader, generally a second class petty officer, is responsible to the squad leader for the effective employment (fire power) of the machine gun for the team. They carry and place the machine gun tripod for action. They also carry one bandolier (belt with pockets to carry machine gun ammunition). During combat, the machine gun team leader is responsible for changing the machine gun barrel, so they carry a kit that contains an extra gun barrel and a combination wrench. The machine gun team leader is armed with a service pistol.

Gunner

The gunner does the actual firing of the machine gun in combat as directed by the team leader. They carry the machine gun, one bandolier of machine gun ammunition, and are armed with a service pistol. Also, they must be able to maintain the machine gun. Generally, the gunner is a third class petty officer.

Ammunition Carrier Number 1

The ammunition carrier number 1, generally a constructionman, acts as the supply man for the team. They carry one box of machine gun ammunition (200 rounds) and the spare barrel case with the Traversing and Elevating (T&E) mechanism. Ammunition carrier number 1 is armed with the service rifle. When not actually engaged in carrying machine gun ammunition, they protect the flank of the machine gun team.

Ammunition Carrier Number 2

Ammunition carrier number 2, generally a construction apprentice, carries two boxes of machine gun ammunition (400 rounds). They are armed with the service rifle and also protect the machine gun team.

2.2.3.7 Antitank (At4) Squad

The antitank squad consists of two three-person teams whose principle mission is defense against armored vehicles (tanks).

Antitank Squad Leader

The antitank squad leader, generally a first class petty officer, has the same basic duties as any other squad leader. In addition, they select and assign the exact positions and targets for the antitank weapons within the areas defined by their platoon commander. The antitank squad leader is armed with the service rifle, and carries binoculars and a compass.

Antitank Team

The antitank team consists of three personnel carrying five AT4s each. These personnel are also armed with service rifles.

2.2.4 Underwater Construction Teams (UCTs)

There are two AC UCTs. These UCTs are commissioned, operational Navy commands organized under the ADCON of their respective SRG subordinate to 1NCD. UCTs (*Figure 1-9*) and/or Detachments (DETs) receive construction project management oversight/tasking (exercising TACON or OPCON only when delegated) through the cognizant NCRs per the 1NCD geographically-designated OAs. UCT ONE is located at Joint Expeditionary Base Little Creek-Fort Story, Virginia, and UCT TWO is located at NBVC Port Hueneme, California.

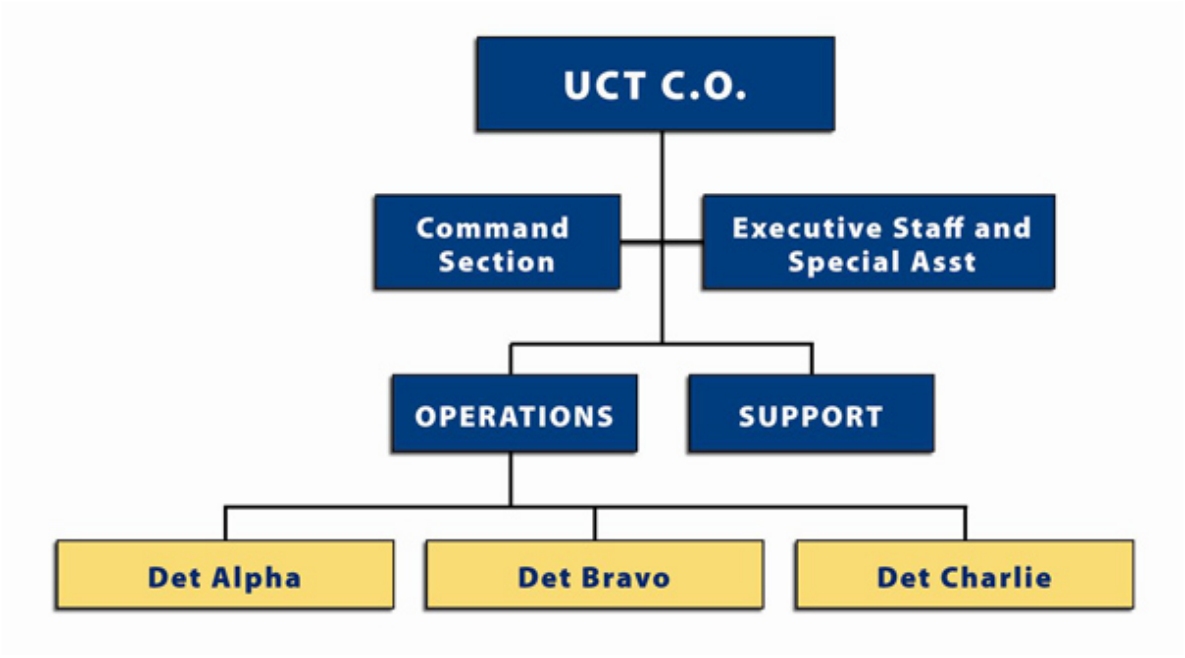


Figure 1-9 — UCT chain of command.

The UCT is a specialized unit that provides a wide range of underwater repair, inspection, and construction expertise. Its sea and shore components each have an assigned unit identification code. Teams are expeditionary and amphibious in nature, consisting of Navy qualified divers from Seabee (OF-7) ratings and support personnel. They accomplish inshore and deep ocean engineering tasks. The danger of underwater construction and the use of explosives for subsurface and terrestrial demolition require Seabee divers to have specialized training, unique skills, and rigorous personal qualification standards. Seabee divers continually exercise these critical readiness requirements throughout their Fleet Response Training Plan (FRTP) to maintain proficiency.

2.2.4.1 Mission of the Underwater Construction Team

The mission of the UCT is to conduct expeditionary, temporary and/or permanent inshore, waterfront, and underwater deep ocean facility construction, inspection, repair, and maintenance operations and to conduct amphibious landing support of JLOTS operations, including Foreign Humanitarian Assistance/ Humanitarian and Civic Assistance (FHA/HCA) and underwater recovery operations. NWP 4-04, *Naval Civil Engineering Operations*, Appendix A, contains a list of engineering and construction tasks within the range of UCT capabilities and a comparison of UCT tasks to those of other Marine Corps and Navy engineer units. Also, OPNAVINST 3501.93 (series), *Required Operational Capabilities (ROC) and Projected Operational Environment (POE)*

for Naval Beach Groups and Their Elements, contains a complete listing of missions and capabilities and COMFIRSTNCDINST 3502.2, *Naval Construction Force (NCF) Training Requirements*, contains the Navy Mission Essential Tasks (NMETs) that a UCT is trained to accomplish.

The UCT is responsible for the following tasks:

1. Port opening operations
2. Beach/channel clearances
3. Geotechnical surveys
4. Hydrographic surveys, including complex inshore and deep ocean underwater construction tasks, such as ocean bottom surveys for potential underwater facilities
5. Light salvage and recovery operations
6. Support of OPDS installation and sustainment operations
7. Underwater construction, maintenance, and repair operations to a depth of 190 ft on facilities such as boat ramps, piers, wharfs, underwater cable systems, underwater pipelines, and mooring systems
8. Underwater inspections
9. Underwater engineering, including inspection, site surveying, and design support

2.3.0 Construction Battalion Maintenance Units (CBMUs)

The CBMUs conduct public works functions at Navy and Marine Corps expeditionary FOBs and constructs Expeditionary Medical Facilities (EMFs). Its personnel and equipment are a modular task organization of air-transportable, ground, and sea logistics elements. Direct labor assets are approximately 50 percent of the total basic allowance that may be assigned directly to construction and contingency operations or other tasking. Each CBMU (*Figure 1-10*) is an integrated Active Component (AC) or Reserve Component (RC) organization; whose AC is an immediate response force and its RC detachments require mobilization and 45-day postmobilization training for employment.

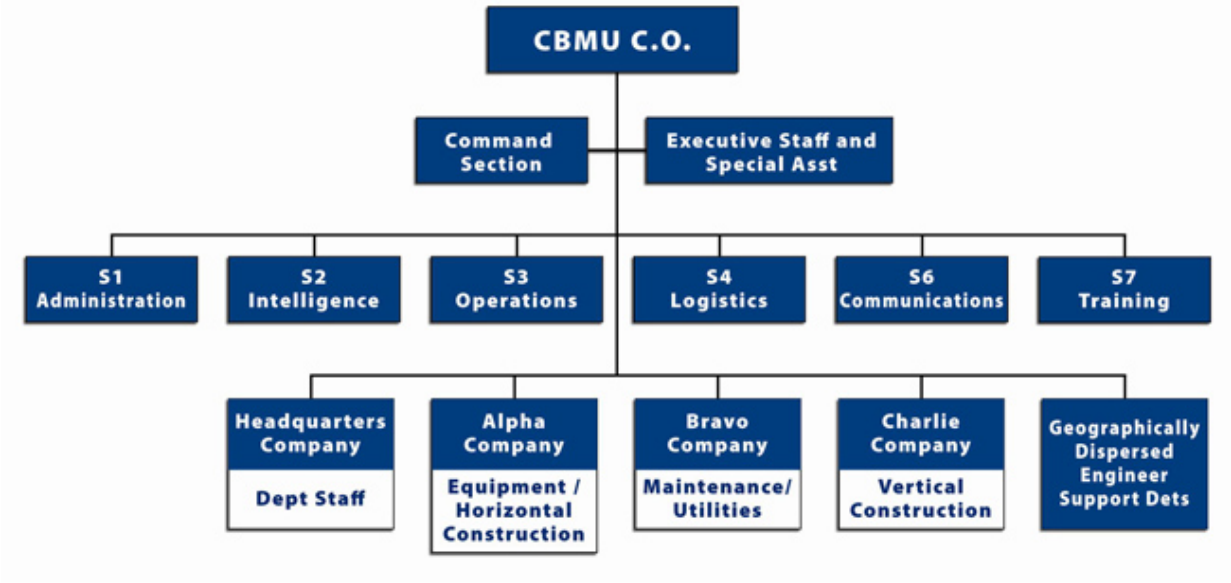


Figure 1-10 — CBMU chain of command.

There are two CBMUs, CBMU-TWO ZERO TWO *(Figure 1-11)* is headquartered at Joint Expeditionary Base Little Creek-Fort Story, Virginia, and CBMU-THREE ZERO THREE *(Figure 1-12)* is headquartered at Naval Base San Diego, California. These CBMUs are shore-based, surge-capable, commissioned operational Navy commands under the ADCON of their respective SRGs subordinate to 1NCD.

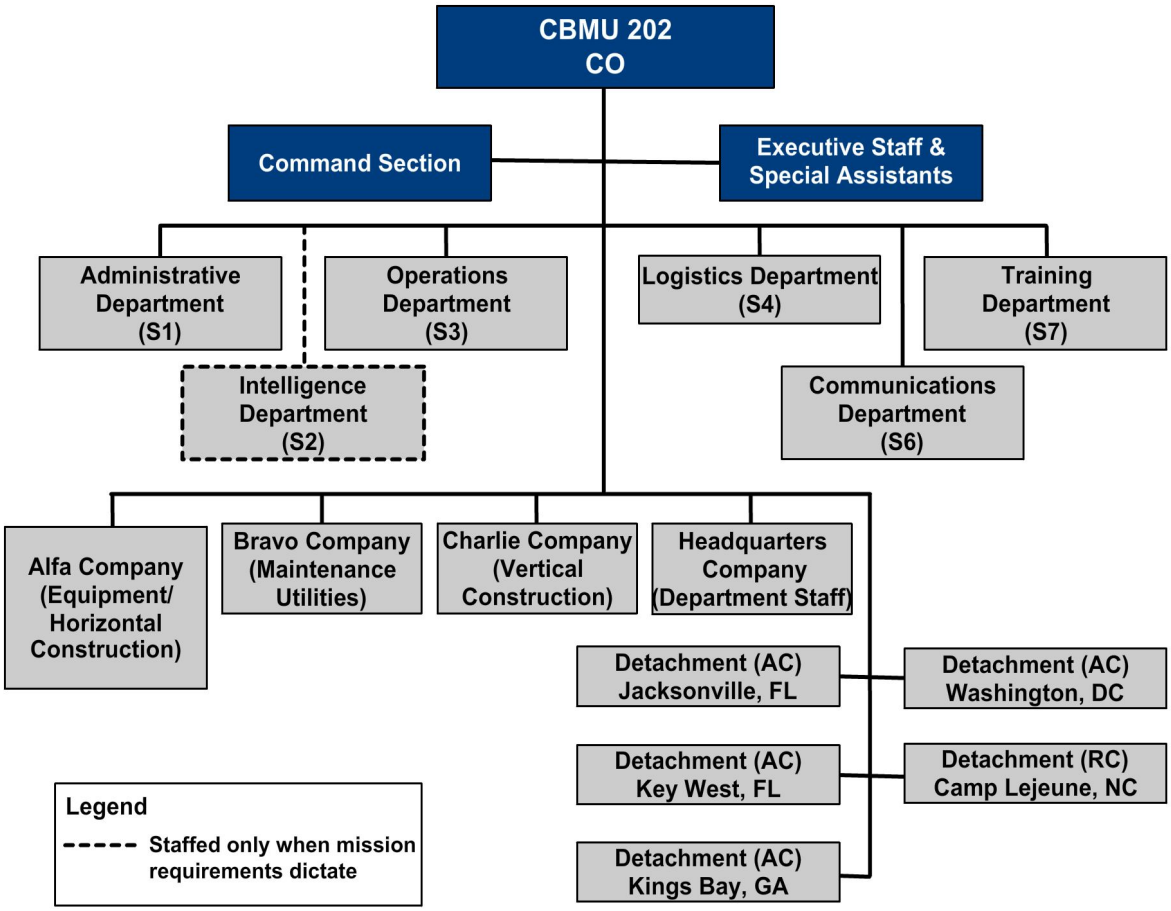


Figure 1-11 — CBMU 202 homeport main-body organization.

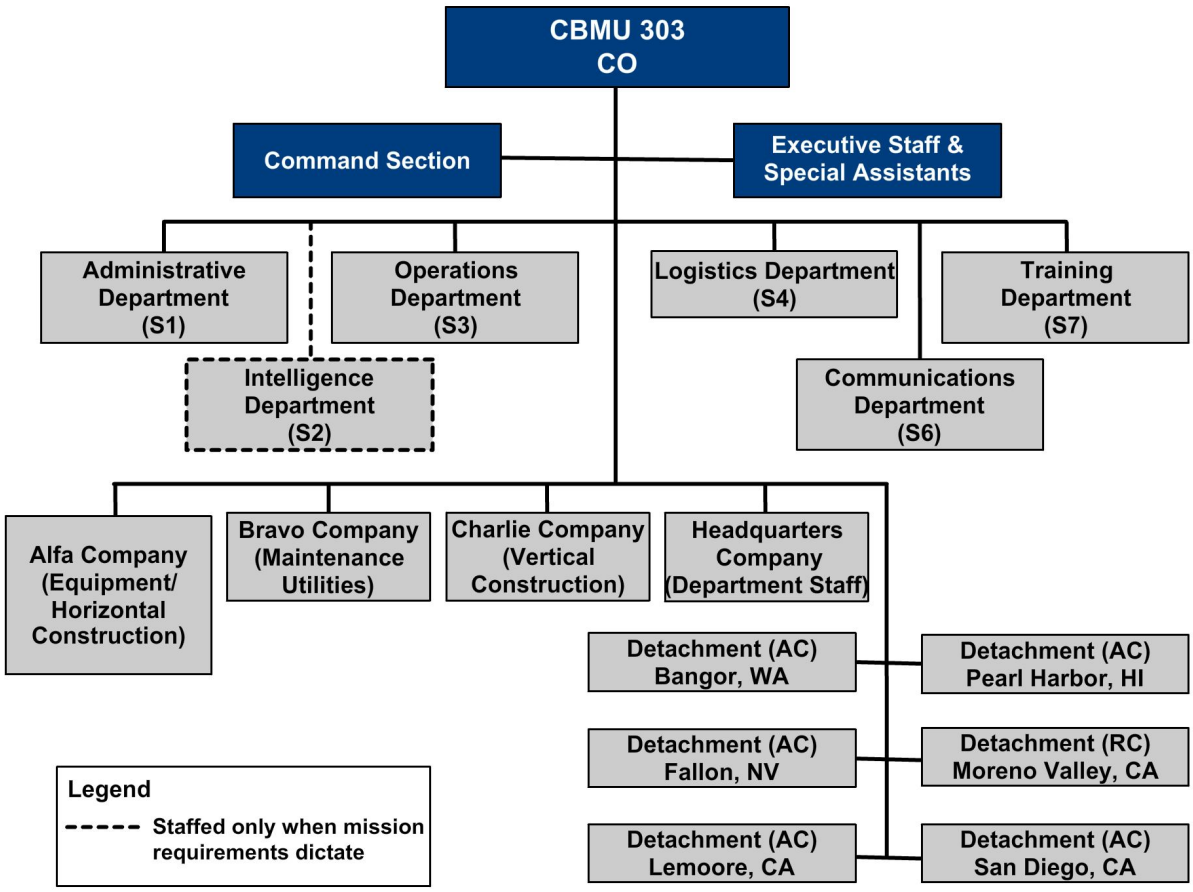


Figure 1-12 — CBMU 303 homeport main-body organization.

The CBMU is responsible for the following tasks:

1. Improving vertical construction
   a) Constructing, improving, and maintaining encampments, Combat Service Dupport Areas (CSSAs), and other Naval Forward Logistics Sites (NFLSs) and required support facilities
   b) Conducting continuing public works, camp improvements, and maintenance management at FOBs
2. Setting up and providing continuing public works operations support and camp improvements
3. Improving limited forward base camps and providing continuing public works operations support
4. Providing CSS for a 1NCD forward-deployed CE
5. Conducting limited base horizontal construction, to include improving and maintaining unpaved roads, expeditionary airfields, and helicopter landing zones
6. Conducting maintenance and repair of utilities, including mobile electric power (systems less than 600 volts) beyond supported units' capabilities and electrical power distribution systems

7. Installing, maintaining, and operating water purification, water storage, and utility distribution systems
8. Creating survivability enhancements, including the construction of protective structures as needed to improve perimeter security for FOB camps
9. Conducting countermobility operations through installation of nonexplosive obstacles and barriers

2.4.0 Amphibious Construction Battalions (PHIBCBs)

There are two PHIBCBs organized under the Naval Beach Group (NBG) as operational Navy commands. PHIBCB-ONE is homeported at NAB Coronado, California, and PHIBCB-TWO is homeported at Joint Expeditionary Base Little Creek-Fort Story, Virginia. *Figure 1-13* illustrates the command relationships of the PHIBCBs.

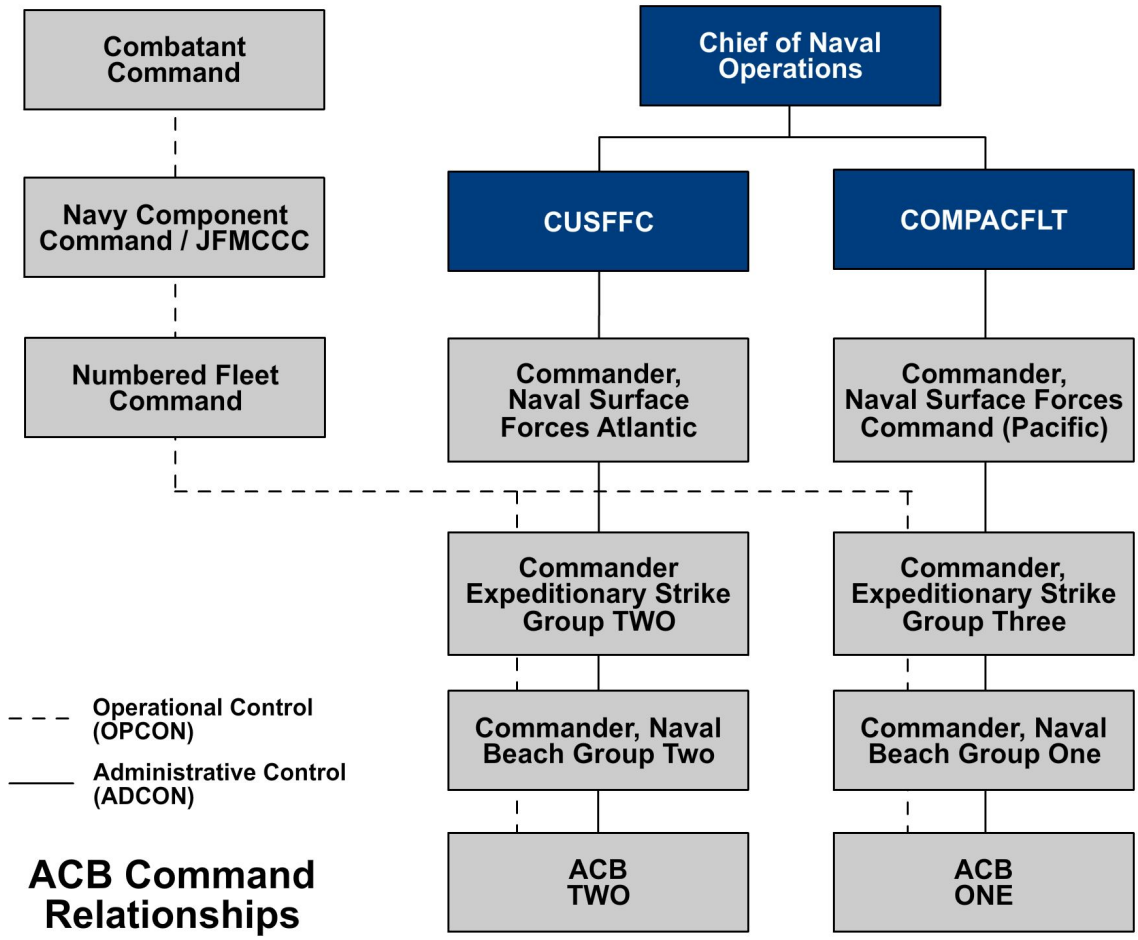


Figure 1-13 — Amphibious Construction Battalion Command Relationships.

The PHIBCB is an operational command that provides tactical elements of personnel and equipment to functional components supporting the Commander, Amphibious Task Force (CATF), for support of the Navy Support Equipment (NSE) during the initial assault and the assault follow-on phases of amphibious landing operations, Maritime Prepositioning Force (MPF) operations, and/or Joint Logistics Over-The-Shore (JLOTS) operations.

Each PHIBCB is an integrated AC/RC organization who's AC is an immediate response force; its RC detachments require a 45-day mobilization and training period for

employment. Its sea and shore components each have an assigned unit identification code. Direct labor assets are approximately 70 percent of the total basic allowance that may be assigned directly to off-load cargo, contingency operations, or other tasking. Although not under 1NCD, PHIBCBs are considered part of the NCF because 75 percent of the officers are CEC officers, 50 percent of the enlisted members are Seabees (OF-7), and the PHIBCB has a limited organic general engineering capability.

2.4.1 Mission of the Amphibious Construction Battalion

The PHIBCBs conduct Ship-to-Shore (STS) transportation of bulk fuel, water, supplies, materials, and equipment in support of amphibious, Logistics Over-the-Shore (LOTS), JLOTS, and MPF operations. They construct and operate tactical camps and conduct related CSS, including general engineering and security support in subsequent operations ashore. NWP 4-04, *Naval Civil Engineering Operations*, Appendix A, contains a list of construction and engineering tasks within the range of PHIBCB capabilities and a comparison of PHIBCB tasks to other Marine Corps and Navy engineer units. Also, OPNAVINST 3501.93 (series), *Required Operational Capabilities (ROC) and Projected Operational Environment (POE) for Naval Beach Groups and Their Elements*, contains a complete listing of missions and capabilities.

Each PHIBCB is responsible for the following tasks:

1. Installing and operating STS bulk liquid systems, OPDS, and the Amphibious Bulk Liquid Transfer System (ABLTS)
2. Conducting lighterage operations with Improved Navy Lighterage System (INLS) and Navy Lighterage (NL) causeway ferries and warping tugs; conducting maintenance and repairs to these powered craft and unpowered section/modules
3. Installing and operating floating causeway piers, Roll-on/Roll-off Discharge Facilities (RRDFs), and Elevated Causeway System (Modular) (ELCAS(M)) piers
4. Operating and conducting maintenance on barges and/or warping tugs in conjunction with causeways, fuel systems, and salvage work
5. Constructing, improving, and maintaining encampments and other logistics beach support areas required by the NSE or Landing Force Support Party (LFSP)

NOTE

Doctrinal camp size is 1,200 personnel for Assault Follow on Echelon (AFOE) mission and 850 personnel for MPF operations.

6. Conducting limited general engineering construction projects in support of beach improvements
7. Conducting beach and camp security support
8. Providing seaward salvage support
9. Operating shoreside cranes
10. Providing beach salvage elements to the beachmaster unit beach party teams

3.0.0 ORGANIZATIONS SUPPORTING THE NAVAL CONSTRUCTION FORCE (NCF)

3.1.0 Navy Expeditionary Combat Command (NECC)

Based on operational requirements, NECC provides combat-ready forces of mission specific units or multimission task-organized force packages to fulfill JFMCC/JFLCC demands by using the existing solid foundation of core capabilities that exists in the Navy's expeditionary force today and in emerging new mission capabilities. Combined under a unified command structure, Navy force readiness and responsiveness increases to support evolving irregular warfare missions in major combat operations, maritime security operations, and maritime homeland security/maritime homeland defense.

3.2.0 Naval Facilities Engineering Command (NAVFAC)

NAVFAC's component commands comprise two subordinate HQ commands, NAVFAC Atlantic and NAVFAC Pacific, and Facilities Engineering Commands (FECs) located around the globe. NAVFAC has four specialty centers, three of which provide significant support to the NCF: Naval Facilities Engineering Service Center (NFESC), Naval Facilities Expeditionary Logistics Command (NFELC), and the Navy Crane Center.

3.3.0 Center for Seabees and Facilities Engineering (CSFE)

The CSFE is located at NBVC Port Hueneme, California, with a Navy CEC captain as its CO. CSFE is one of 15 learning centers that report to the Naval Personnel Development Command in Norfolk, Virginia. The center provides Seabees, CEC officers, facility engineers, and environmental professionals with the skills, knowledge, and education necessary for lifelong learning to provide quality support to the fleet.

3.4.0 Naval Construction Forces Command (NCFC)

NCF units under 1NCD currently operate out of two primary CONUS locations: CBC Gulfport, Mississippi, and NBVC Port Hueneme, California. Not all NCF units are based out of these locations, although they are central to NCF training, TOA equipment management, and mobilization. Other locations are detailed throughout this publication when describing each unit.

3.5.0 Reserves

NCF reserves are organized under the FIRST NCR, THIRD NCR, SEVENTH NCR, NINTH NCR, and their subordinate RC units. Additionally, NCF reserves are also assigned to AC units such as 1NCD, the CBMUs, and the PHIBCBs under the NBGs.

4.0.0 LAWS OF ARMED CONFLICT

The laws of armed conflict are the concern of every member of the Armed Forces: Soldiers, Sailors, Airmen, Marines, and yes, even Seabees. Because of the important sound of the term "laws of armed conflict," it might appear that only people, such as the CNO, the Secretary of the Navy, the Secretary of Defense, and the President, concern themselves with the rules of war. While over the years individuals such as these from many countries have drafted the basic documents governing the treatment of people in wartime, the laws of armed conflict remain the direct concern of every service member.

The principles behind the laws of armed conflict are stated as such, “How you, an individual Seabee, conduct yourself in wartime operations to accomplish your mission while still respecting the rights of civilians, your enemies, and your allies.” The next few sections will provide some basic information on what to do and, just as important, what not to do in wartime situations.

4.1.0 Why we need Laws in War

Unfortunately, war is as old as man himself. People cause wars; weapons do not. Man creates the weapons that are merely the instruments that a nation uses to carry out its war objectives. Genghis Khan, the ancient Asian warlord, killed or maimed a greater percentage of people than any other leader in history. He did it with bows and arrows and other similar primitive weapons. During Genghis Khan’s era, there were no rules of war. Even though the human continues to be the force behind the weapons, there exists a certain orderliness to which people subscribe to when they find themselves on a battlefield.

The positive side of mankind has managed to improve the conditions under which war is conducted since the era of Genghis Khan. As newer weapons of warfare have made it easier for man to kill their fellow man, nations have sensed a need to eliminate unnecessary death, destruction, and suffering. This need has been reflected in the moral values of civilized man and also in military policies.

Binding customs and formal laws of war, presented in the Geneva conventions and The Hague regulations, have evolved. They legally bind most nations to the practices set down at Geneva and The Hague. The United States has agreed to these rules. Any violation of them is the same as a violation of the laws of the United States itself. The United States has led the world in adopting rules for its military forces. These rules recognize that enemies are also human beings and that captured or detained people are entitled to retain their fundamental rights as humans regardless of their past conduct or beliefs. Every Seabee has the duty, therefore, to know and obey the laws of armed conflict.

History shows that discipline and high morale led our military forces to victory in battle after battle. These same characteristics apply to obedience to the laws of armed conflict. Although a Seabee will be in uniform and be an instrument of a nation state (the United States) in an armed conflict, this does not give them license to do anything they wish to do. There are limits on what can be done when waging war and those limits are established by the laws of armed conflict. This chapter explains what a Seabee can and cannot do.

5.0.0 GENERAL PRECEPTS OF THE LAWS OF ARMED CONFLICT

When entering into armed conflict in another country, the Seabee should be aware of many of the characteristics of the country. Knowledge of these characteristics will better prepare them to follow the tenets of the laws of armed conflict.

5.1.0 Geography

A general understanding of the geography of a nation will help one to know where the population of the country is concentrated. That knowledge is important for preparation in dealing with civilians and the enemy as they are encountered. In addition, before operating, it is important to know the general area of the country and the nations that

border it. This knowledge may help in understanding any trends that may have an effect on carrying out the laws of armed conflict. The capital city and the other major cities should be known, as well as the characteristics of the land (mountains, deserts, plains, etc.), and the climate. Knowledge of all these features will help when dealing with rules of war situations that might arise during time in the country. Service members should receive information about the general characteristics of the geography of a nation as part of instructional briefings given in operational deployments.

5.2.0 People

Knowledge of the people in a country can be invaluable to service members in how they conduct themselves under the rules of war. Since nearly all offenses under the laws of armed conflict involve people, the more that is known about the civilian populace of a country and of the enemy, the better off the service member will be. Their ethnic backgrounds, their language, the educational level of the people, the important cultural characteristics (particularly if they are different than the culture of the United States), the religions of the country, and the social customs of the people should be known.

Knowledge of the people is probably the most important thing to know about the country. Without it, it is difficult to understand the way the people think and act. Accordingly, the chances of doing something in violation of the rules of war increase. If the enemy and the people are one and the same, then the questions posed above will serve for both. If not, the same questions about the enemy need to be asked. It is important to know both the military and nonmilitary characteristics of the enemy.

5.3.0 History

There is no need to know the long and detailed history of a country, except as it relates to why someone is there. Historical circumstances involving politics, religion, or cultural values may have led to a service member being in the country. It is important to have knowledge of, and be sensitive to, the historical circumstances dictating U.S. Armed Forces' involvement in the country. It is important to pay attention during briefings on these matters. Articles on the subject should also be read (newspapers, periodicals, etc.). Knowing the history of the country as it relates to military involvement may serve the service member well if a situation exists where one has to decide what action(s) to take in a wartime situation under the laws of armed conflict.

5.4.0 Economy

Is the country poor or wealthy? Does it have wealth concentrated in a few people and enormous pockets of poverty among the general populace? It is important to have answers to these questions because such conditions may contribute to the way one deals with the people and the enemy of the country. Current economic conditions are also important. (These conditions include growth, inflation, deflation, unemployment, poverty, etc.). Knowledge of the economic condition of a country can lead to an understanding of how the people and the enemy of the country might behave toward service members or foreignors. It might also assist in preventing a violation of the rules of war.

5.5.0 Foreign Relations

Knowing the alliances, Allies, traditional enemies (if any), and the role of the country in international organizations (for example, the United Nations) can provide the service member with an understanding of what to expect. When in another country, the

following question should be asked. Will the country comply with the laws of armed conflict that we fight under, or can we expect behavior contrary to our training?

5.6.0 Government

Knowing something about the nature of the national government in a country may better prepare one to understand the nature and conduct of the enemy as well as the civilian populace. Is the government of the country bound by the Geneva conventions and The Hague resolutions? Will the government prosecute someone for a crime against civilians or against the enemy for a violation of the rules of war? Even if the government does not comply with the rules of war in any way, an obligation as a Seabee is to conduct themselvesunder the laws of armed conflict that they are taught.

6.0.0 RELATIONS WITH THE COUNTRY BEING ENTERED

The relations of the United States' with the country being entered may be good, bad, or somewhere between these two extremes. The government of the country may want the Seabees to be there, but some of its people may not. Situations or actions from the enemy, or from the general population, may be encountered that will try the service member's patience. Statements such as, "Yankee, Go Home!" may be heard. If so, the service member must maintain self-control and not violate the principles learned under the laws of armed conflict. Service members should be familiar with U.S. relations with the country they are entering. This knowledge can serve well in preventing the creation of a situation where one might violate the rules of war.

Along with knowledge of the country, it is important to fully understand the mission. While conducting a mission, a situation may develop where there will be an opportunity to succeed or fail in the practice of the laws of armed conflict.

This chapter contains important information to provide sufficient knowledge of what to do and what not to do under most combat situations. This knowledge protects the service member from violating the laws of armed conflict. When encountering a situation where one is unsure of what action(s) to take in carrying out a mission, clearance from the next higher authority should be obtained before continuing. For example, when military action by a service member might endanger the lives of some local civilians and it is not sure how to proceed, it is important to get approval for the next action from the next higher authority.

7.0.0 YOUR CONDUCT UNDER THE LAWS OF ARMED CONFLICT

The laws of armed conflict state what can and cannot be done in combat situations. With the training received, necessary discipline is provided to ensure the service member will be able to do the right thing. But if a Seabee does not learn how to conduct their actions in combat, they will be punished for mistakes.

All persons in uniform, carrying a weapon or participating in any way in military operations or activities, are known as combatants. Under the laws of armed conflict, only combatants are considered proper targets and may be fired upon. All others are called noncombatants. Noncombatants include civilians, medical personnel, and chaplains. Knowing the difference between combatants and noncombatants in guerrilla war situations may sometimes be difficult and require great care. Humane treatment of noncombatants may help in obtaining valuable intelligence to better pursue a mission. If

in doubt about the differences between combatants and noncombatants, a superior should be consulted before a course of action is pursued.

7.1.0 Enemy Combatants

Enemy soldiers who surrender or enemy soldiers who are captured, sick, or wounded should never be attacked. When handling prisoners of war (POWs), the six Ss: search, secure, silence, segregate, safeguard, and speed the prisoners to the rear should be followed. A prisoner must never be killed, tortured, or mistreated because such actions are a violation of the law. Besides, prisoners may be able to give vital information about the enemy. Treating a prisoner badly also discourages other enemy soldiers from surrendering, and it strengthens their will to resist. But if prisoners are treated well, fairness encourages the enemy to treat their prisoners (U.S. buddies) well. Humane treatment of POWs is right, honorable, and required under the laws of armed conflict. Improper treatment of prisoners is punishable by court-martial.

Enemy soldiers should be allowed to surrender. The enemy may use different signals to convey they are surrendering, but all of the signals should be noticeable. It is illegal to fire on an enemy that has thrown down their weapons and offered to surrender.

Medical care should also be provided to the wounded—whether friend or foe. Under the laws of armed conflict, it is a requirement to provide the same medical care to the sick and wounded as would be provided for the service member's own personnel.

When someone is captured, it may not be easy to determine whether the person is an enemy. That determination is made by specifically trained personnel at a higher headquarters. Captives may be questioned about military information of immediate value to a mission, but threats, torture, or other forms of coercion may never be used to obtain information.

Personal property may never be taken from a prisoner, except those items that are clearly of a military or intelligence value (weapons, maps, or military documents). These items may only be taken after the prisoner has been secured, silenced, and segregated. Nothing that is not of military value may be taken. Only an officer may take custody of the personal effects of a prisoner.

Captives may perform some types of work but the work must not relate to assisting the captive's enemy's war effort. The acceptable work performed must be limited to allowing captives to dig foxholes or build bunkers only for their own protection. Under the laws of armed conflict, captives may never be used as a shield for an attack or defense against the enemy; to search for, clear, or place mines or booby traps; or to carry the captive's enemy's ammunition or heavy gear.

Under the rules of armed conflict, service members are not permitted to attack villages, towns, or cities. But service members are allowed to engage the enemy that is in a village, town, or city, and to destroy any equipment or supplies that the enemy has there when it is mission-essential. In all cases, it is not permissible to create more destruction than is necessary to accomplish the mission. When using firepower in a populated area, only military targets must be attacked.

Protected property may not be attacked. While some protected property may mean little to some, the property in question may be of cultural importance to the people of the country. Examples of protected property include buildings dedicated to religion, art, science, or charitable purposes; historical monuments; hospitals and places where the sick and wounded are collected and cared for; and schools and orphanages for children. When the enemy uses these places for refuge or for offensive purposes, a

commander may order an attack. It is common sense to destroy no more than the minimum amount of protected property consistent with carrying out the mission. To do more may undermine the mission.

7.2.0 Civilians

Earlier in this chapter, the reasons for knowing as much as possible about the country in which service members conduct operations were discussed. Once there, civilians and private property need to be treated as though it belonged to the service member.

The rights of civilians in war zones should not be violated. When something is known about the culture and practices of the people, there should be little trouble recognizing the rights of civilians. Civilians should be protected from acts of violence, threats, and insults—both from the enemy and from fellow Seabees. On occasion, it may be necessary to move or resettle civilians because such action is urgently required for military activities. Under no circumstance should civilian property be burned without approval of higher authority. Similarly, property should never be stolen from civilians. Failure to obey these rules is a violation of the laws of armed conflict and punishable by court-martial.

Under no circumstances should medical personnel or equipment used for the welfare of the people or the enemy be fired upon. Most medical personnel and facilities are marked with a red cross on a white background. However, a few countries use a different symbol. This is one of the reasons it is important to be familiar with the customs of the country in which operations are conducted. Similarly, Seabees should never pose as a Red Cross representative when they are not. Life may depend on proper use of the Red Cross symbol.

Parachutists are considered helpless until they reach the ground. Under the rules of war, it is not permissible to fire at parachutists while they are in the air. If they resist with weapons upon landing or do not surrender, they may be attacked. Paratroopers, on the other hand, are always considered combatants and may be fired on while they are still in the air.

Under the laws of armed conflict, poison or poisoned weapons may not be used. However, nonpoisoning weapons to destroy the food and water of the enemy may be used.

Weapons may not be altered to cause unnecessary suffering by the enemy. Altered rounds cannot be used to inflict greater destruction on the enemy. These alterations are forbidden under the laws of armed conflict.

8.0.0 WHAT HAPPENS WHEN RULES ARE VIOLATED

Some basic rules have been provided to show what can and cannot be done in a wartime situation, as they relate to the laws of armed conflict. This section provides instructions on what action should be taken if the rules are violated by other personnel.

Violations of the laws of armed conflict by others must be prevented because they are criminal acts. When a criminal act in progress is witnessed and about to happen, it should be prevented by:

- Arguing against it
- Threatening to report the criminal act
- Repeating the orders of your superiors

- Stating your personal disagreement
- Asking a senior individual present to intervene

If a Seabee is totally familiar with the country during an operation and knowledgeable about the rules of war, it is possible to prevent a criminal act. In the event the criminal act immediately endangers the life of the witness or the lives of others, the exact amount of force needed to prevent the crime may be used—but only as a last resort. If the criminal act (or act about to be committed) is committed by an immediate superior, the act should be reported to their immediate superior. This is a requirement by the laws of armed conflict. Conversely, it cannot be required to commit a crime under the laws of armed conflict. If a service member is ordered to commit a crime under the rules of war, they must refuse to follow the order and their refusal reported to the next higher authority. A Seabee can be prosecuted for carrying out an unlawful act under the laws of war, so it is important to know what is legal and the rules of armed conflict should be followed.

8.1.0 Code of the U.S. Fighting Force

The Code was prescribed by the President of the United States in 1955 as a simple, written creed applying to all members of the Armed Forces of the United States. The words of the Code, presented in six articles, state the principles that Americans have honored in all the wars this country has fought since 1776.

The Code is not intended to provide guidance on every aspect of military life. For that purpose there are military regulations, rules of military courtesy, and established customs and traditions. The Code is in no way connected with the UCMJ. The UCMJ has punitive powers; the Code does not.

The six articles of the Code can be divided into three categories. Articles I and VI are general statements of dedication to country and freedom. Conduct on the battlefield is the subject of Article II. Articles III, IV, and V concern conduct as a prisoner of war.

8.1.1 Article I

I am an American, fighting in the forces which guard my country and our way of life. I am prepared to give my life in their defense.

It is a long-standing tradition of American citizens to answer the call to arms willingly when the peace and security of this Nation are threatened. Patrick Henry stated it best in the early days of our country when he said, ". . . give me liberty or give me death." Nathan Hale, captured by the British during the revolutionary war and charged with spying, personified the spirit of an American fighting for freedom, when he spoke the immortal words, "I only regret that I have but one life to lose for my country," just before his execution by hanging.

More recently, the threat to America has been less obvious as small countries, such as South Korea and South Vietnam, have borne the brunt of attacks by the enemy. Nevertheless, Americans have risen to the challenge and have proven their dedication and willingness to make the supreme sacrifice as much as in any of the wars in our history.

In June 1965, Construction Mechanic Third Class Marvin G. Shields served with U.S. Navy Seabee Team 1104 at Dong Koai, supporting 5th Special Forces Group (Airborne), 1st Special Forces. Although wounded when a reinforced Viet Cong regiment using a machine gun, heavy weapons, and small arms placed intensive fire on the unit, CM3 Shields continued to resupply his fellow Americans with needed

ammunition to return the enemy fire for a period of approximately 3 hours. Wounded a second time during this attack, CM3 Shields assisted in carrying a more critically wounded man to safety. Then, he resumed firing at the enemy for 4 more hours. CM3 Shields unhesitantly volunteered to accompany the commander and knock out an enemy machine gun emplacement that was endangering the lives of all personnel in the compound because of the accuracy of the enemy fire. Advancing toward the objective with a 3.5-inch rocket launcher, the two men succeeded in destroying the enemy machine gun emplacement, undoubtedly saving the lives of many of their fellow servicemen.

CM3 Shields fell mortally wounded by hostile fire while returning to his position. He was later awarded the Medal of Honor for his courageous actions. His bold initiative and fearless devotion to duty are perfect examples of the meaning of the words of Article I of the Code.

8.1.2 Article II

I will never surrender of my own free will. If in command, I will never surrender the members of my command while they still have the means to resist.

This is an American tradition that dates back to the Revolutionary War. An individual may never voluntarily surrender. If isolated and unable to fight the enemy, they are obligated to evade capture and rejoin friendly forces at the earliest possible time.

John Paul Jones always comes to mind when one reads Article II of the Code. In 1779 the captain of the *Bonhomme Richard* challenged two British ships of war, the *Serapis* and the *Countess of Scarborough.* Old, slow, and hopelessly outclassed the *Bonhomme Richard* was being badly battered, repeatedly set on fire, and rapidly filling with water when the captain of the *Serapis* called, “Do you ask for quarter?”

“I have not yet begun to fight,” replied John Paul Jones. Hours later, the *Serapis* struck her flag; and Jones and his crew boarded and captured the British ship as they watched their own ship sink.

When a unit is involved, the officer in command may never surrender that unit to the enemy while it has the power to resist or evade. A unit that is cut off or surrounded must continue to fight until it is relieved by, or able to, rejoin friendly forces.

8.1.3 Article III

If I am captured, I will continue to resist by all means available. I will make every effort to escape and aid others to escape. I will accept neither parole nor special favors from the enemy.

8.1.4 Article IV

If I become a prisoner of war, I will keep faith with my fellow prisoners. I will give no information or take part in any action which might be harmful to my comrades. If I am senior, I will take command. If not, I will obey the lawful orders of those appointed over me and will back them up in every way.

8.1.5 Article V

When questioned, should I become a prisoner of war, I am required to give name, rank, service number, and date of birth. I will evade answering further questions to the utmost of my ability. I will make no oral or written statements disloyal to my country and its Allies or harmful to their cause.

The misfortune of being captured by the enemy does not end a Seabee's usefulness to their country. Their duty is to continue to resist the enemy by all possible means and to escape and assist others to escape. A Seabee may not accept parole from the enemy or special favors, such as more food, warm clothes, less physical restrictions, and so forth, in return for promises not to escape or for informing or providing information to the enemy.

Informing, or any other action endangering the well-being of a fellow prisoner, is forbidden. Prisoners of war must not help the enemy by identifying fellow prisoners who may have knowledge of particular value to the enemy and who may, therefore, be made to suffer brutal interrogation.

Strong leadership is essential to discipline. Organization, resistance, and even survival may be extremely difficult without discipline. Personal hygiene, sanitation, and care of the sick and wounded prisoners of war are an absolute "must." All United States officers and noncommissioned officers must continue to carry out their responsibilities and exercise their authority if captured.

The senior line officer or noncommissioned officer within a prisoner of war camp, or a group of prisoners, must assume command according to rank or date of rank, without regard to branch of service. The senior line officer is the lawful superior of all lower ranking personnel. If the senior officer or noncommissioned officer is incapacitated or unable to command for any reason, command must be assumed by the next senior man. This responsibility cannot be avoided.

8.1.6 Article VI

I will never forget that I am an American, fighting for freedom, responsible for my actions, and dedicated to the principles which made my country free. I will trust in my God and in the United States of America.

Article VI and Article I of the Code are quite similar. The repeated words *I am an American, fighting for freedom,* are perhaps the most important words of the Code, because they signify each American's faith and confidence in God, country, and service. Since John Paul Jones made his defiant reply, "I have not yet begun to fight," to the present, Americans have traditionally fought the enemy wherever they were found and with whatever weapons were available. When captured, the American, fighting for freedom, has continued the battle in a new arena. When facing a Communist interrogator, they have been under fire just as though bullets and shell fragments were flying about them. Disarmed, the POW has fought back with mind and spirit, remaining faithful to fellow POWs, yielding no military information, and resisting every attempt of indoctrination. Every Seabee has the responsibility to honor these traditions by carefully adhering to the meaning of each article of the Code. The many Americans who have accepted this responsibility are heroes in the finest sense of the word.

In February 1966, Lieutenant (jg) Dieter Dengler, USNR, was on a bombing mission over North Vietnam when his aircraft was badly damaged by ground fire. LTJG Dengler crash-landed his aircraft in nearby Laos and attempted to evade capture. After successfully evading the enemy for one day, he was captured and led to a village where he was interrogated and told to sign a Communist propaganda statement condemning the United States. LTJG Dengler's repeated refusal to give more than his name, rank, service number, and date of birth, or to sign any statements, resulted in severe beatings. When he continued to refuse to answer questions, he was tied behind a water buffalo that dragged him through the brush. The interrogations and beatings continued for three days, but LTJG Dengler refused to give in. Later, he escaped from his guards

but was recaptured and again severely beaten. After six months in captivity, LTJG Dengler successfully escaped, killing several enemy guards in the process. On the seventeenth day, a pilot who escaped with him was killed, and LTJG Dengler had to continue alone. Although suffering from malnutrition, jaundice, fatigue, and badly cut and swollen feet, LTJG Dengler refused to give up. Finally, on the twenty-second day after his escape, he managed to lay out a crude SOS on a bed of rocks and attract the attention of a United States Air Force aircraft. Later, a rescue helicopter plucked him to safety and ended his ordeal.

The stories of Americans, fighting for freedom, that have steadfastly followed both the spirit and letter of Articles III, IV and V of the Code are numerous.

We all recognize that full compliance with the laws of armed conflict is not always easy, especially in the confusion and passion of battle. For instance, a service member might be extremely angry and upset because their unit has taken a lot of casualties from enemy booby traps or hit-and-run tactics. But they must NEVER engage in reprisals or acts of revenge that violate the laws of armed conflict.

Summary

In this chapter, you were made aware of how the Seabees got their start. Now you should understand why we need the Seabees and the importance of their heritage. You were also introduced to some of the organizations within the Seabees and the chain of command that encompasses them. Finally you were introduced to the laws of armed conflict. You learned why—even in a time of war—you have rules to follow and why you follow them. Through this heritage you too will become a valuable asset to the Seabees and the Navy overall.

Assignment 1

Objectives

1. Describe the events that led to the establishment of the Civil Engineer Corps (CEC) and the Seabees.
2. Identify the general organization of the Naval Construction Force (NCF), types of Seabee Units within the NCF, and their objectives and organization.
3. Identify the services provided by the organizations that support the Naval Construction Force.
4. Identify the mission, function, and structure of the Naval Mobile Construction Battalions (NMCBs).
5. Describe the organization and mission of the Headquarters Company and the duties of its personnel.
6. Describe the duties of the rifle company personnel.
7. Identify the members of a rifle platoon and their duties.
8. Identify the members of a rifle squad and their duties.
9. Identify the members of a rifle fire team, their duties, and individual weapons.
10. Identify the fire support elements of the rifle companies in a battalion, and denote individual responsibilities.
11. Identify the members of the machine gun and antitank squads, their equipment, and duties.

Questions

1. What year was the Navy Civil Engineer Corps (CEC) established?

    1. 1866
    2. 1867
    3. 1876
    4. 1877

2. The abbreviation for which term is the origin of the Seabee name?

    1. Construimus, Batuimus
    2. Carpenter, Builder
    3. Construction Battalion
    4. Sea going Builders

3. The Seabees landed with the Marines on what Pacific Island to put a shell-pocked airfield back in operation?

    1. Tarawa
    2. Tinian
    3. Guadalcanal
    4. Iwo Jima

4. The Seabees were sent to Yo Do in the Bay of Wonson to build an airstrip. They completed this daunting task in how many days?

    1. 13
    2. 15
    3. 16
    4. 19

5. Beginning in 1955, Seabees began deploying to what continent?

    1. Asia
    2. Europe
    3. South America
    4. Antarctica

6. In what theater did CM3 Marvin G. Shields receive the Medal of Honor?

    1. Vietnam
    2. Korea
    3. Iwo Jima
    4. Guadalcanal

7. What U.S. President was made an honorary Seabee?

    1. Jimmy Carter
    2. Ronald Reagan
    3. Richard Nixon
    4. John F. Kennedy

8. What organization is responsible for conducting public works functions at Navy and Marine Corps Expeditionary forward operating bases?

    1. CBMU
    2. PHIBCB
    3. UCT
    4. CSFE

9. What organization is responsible to construct and operate tactical camps and conduct maintenance on barges?

    1. CBMU
    2. PHIBCB
    3. UCT
    4. NAVFAC

10. What organization is responsible for conducting port opening operations and geotechnical surveys?

    1. CBMU
    2. PHIBCB
    3. UCT
    4. 1NCD

11. NAVFAC is an Echelon II systems command located at the Washington Navy Yard, Washington, D.C., and is commanded by a Navy …….

    1. Lieutenant commander.
    2. Commander.
    3. Captain.
    4. Rear admiral (upper half).

12. Where is First Naval Construction Division headquartered?

    1. Port Hueneme, CA
    2. Joint Expeditionary Base Little Creek-Fort Story, VA
    3. NAB San Diego, CA
    4. Washington Navy Yard, DC

13. Naval Construction Training Centers (NCTCs) are tenant commands that provide training schools for NMCB personnel and are under the direction of …….

    1. NAVFAC.
    2. NCR.
    3. UCT.
    4. CBC.

14. Which of the following objectives is a capability of the Naval Construction Regiment?

    1. Deploys as a single unit
    2. Provides commad and control over subordinate units in homeport
    3. Functions as the CE of a MEF
    4. Replaces an Army Corps mission assignment

15. What command is responsible to identify training deficiencies and to provide program support to the Seabees?

    1. SRG
    2. NAVFAC
    3. UCT
    4. 1NCD

16. Who has the primary mission of constructing advance base facilities in support of the armed forces?

    1. SRG
    2. NMCB
    3. CBMU
    4. NCR

17. A headquarters company is organized into a total of how many rifle platoons?

    1. 1
    2. 2
    3. 3
    4. 4

18. Protecting and defending the battalion command post are the responsibilities of what person?

    1. The company chief petty officer
    2. The platoon commander
    3. The headquarters company commander
    4. The squad leader

19. What individual may serve as a headquarters' platoon commander in a battalion?

    1. Admin officer
    2. Supply chief
    3. Project crew leader
    4. Ammunition officer

20. During home-port training periods, what person is responsible to the Company Commander for performing administrative tasks?

    1. Company chief petty officer
    2. Company clerk
    3. Project crew leader
    4. Right guide

21. The rifle company guidon is responsible for coordinating supplies, distributing ammunition and what other task?

    1. Delivering mail
    2. Typing reports
    3. Duty task officer
    4. Construction expediter

22. What member of the rifle company performs the duties of the mail orderly?

1. Chief
2. Clerk
3. Guidon
4. Squad leader

23. A Seabee rifle platoon consists of a platoon headquarters and at least how many rifle squads?

1. 1
2. 2
3. 3
4. 4

24. What is the rank of the Assistant Rifle Platoon Commander?

1. Ensign
2. Lieutenant junior grade
3. Senior chief petty officer
4. Chief petty officer

25. Keeping the rifle platoon personnel supplied with construction and combat materials is a task assigned to what member of the rifle platoon headquarters?

1. Commander
2. Messenger
3. Guide
4. Petty officer

26. The rifle squad ideally consists of how many personnel?

1. 13
2. 14
3. 15
4. 16

27. The rifle squad leader is generally of what rank?

1. First class petty officer
2. Second class petty officer
3. Third class petty officer
4. Seaman

28. In combat, the grenadier always moves with or is close to whom?

    1. Squad leader
    2. Platoon commander
    3. Rifle company chief
    4. Corpsman

29. The rifle fire team will generally consist of how many personnel?

    1. 1
    2. 2
    3. 3
    4. 4

30. The senior fire team leader serves as an assistant to the …….

    1. Squad leader.
    2. Automatic rifleman.
    3. Grenadier.
    4. Rifleman number 1.

31. What member of the fire team may act as a scout?

    1. Rifleman number 1
    2. Corpsman
    3. Grenadier
    4. Automatic rifleman

32. What member of the fire team is the “backbone” of the team?

    1. Fire team leader
    2. Automatic rifleman
    3. Rifleman number 1
    4. Rifleman number 2

33. What machine gun team member is armed with the service pistol?

    1. Ammunition carrier number 1
    2. Ammunition carrier number 2
    3. Gunner
    4. Squad leader

34. Why is it important for a Seabee to know about the laws of armed conflict?

    1. It explains the rights of the civilians
    2. It outlines the tactics used to infiltrate the enemy
    3. It notifies you of your rights under the Geneva conventions
    4. It provides details on weapon usage for combat

35. As a Seabee fighting in a foreign country, what type of information about the country is of most importance to you?

    1. People
    2. Geography
    3. History
    4. Economy

36. Under the laws of armed conflict, what person would be considered a combatant?

    1. Uniformed chaplain
    2. Hospital corpsman
    3. Armed guerrilla
    4. Civilian

37. Under the laws of armed conflict, a violation of which of the following principles in handling Prisoners Of War (POWs) would result in punishment?

    1. Search and secure
    2. Silence and segregate
    3. Strip and sanitize
    4. Safeguard and speed to the rear

38. If you mistreat POWs, you are subject to which of the following punishments?

    1. Verbal reprimand
    2. Letter of reprimand
    3. Captain’s mast
    4. Court-martial

39. After capturing an enemy soldier, you can take which of the following articles from them?

    1. Weapon
    2. Watch
    3. Personal photograph
    4. Food

40. Under the laws of armed conflict, POWs are allowed to perform the following task.

    1. Sheild you from enemy attack
    2. Search for, clear, or place mines
    3. Carry heavy equipment
    4. Dig foxholes for their own protection

41. **(True/False)** Parachutists are considered combatants and can be fired upon while they are still in the air.

    1. True
    2. False

42. Under the laws of armed conflict, Seabees can take which of the following actions without approval from higher authority?

    1. Burn civilian homes
    2. Pose as Red Cross volunteers
    3. Destroy the noncombatant food and water supplies
    4. Refuse orders to commit criminal acts

43. Conduct for U.S. Service members as POWs is specified the following articles of the Code of the U.S. Fighting Force?

    1. I and VI
    2. II only
    3. III, IV, and V
    4. II and V

44. Conduct of Seabees on the battlefield is addressed in what article of the Code of the U.S. Fighting Force?

    1. I
    2. II
    3. III
    4. IV

45. What article of the Code of the U.S. Fighting Force dictates that “I will never forget that I am an American, fighting for freedom, responsible for my actions, and dedicated to the principles which made my country free. I will trust in my God and in the United States of America.”?

    1. II
    2. III
    3. V
    4. VI

ASSIGNMENT 1

History and Organization of the Seabees and the Laws of Armed Conflict

Directions: Select the correct answer from the list of alternates below each question in the end of chapter assignment. Write in the answer next to the corresponding question number below. Use this answer sheet as a reference to completing the online assignment related to this assignment.

1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	
12.	
13.	
14.	
15.	

16.	
17.	
18.	
19.	
20.	
21.	
22.	
23.	
24.	
25.	
26.	
27.	
28.	
29.	
30.	

31.	
32.	
33.	
34.	
35.	
36.	
37.	
38.	
39.	
40.	
41.	
42.	
43.	
44.	
45.	

Additional Resources and References

This chapter is intended to present thorough resources for task training. The following reference works are suggested for further study. This is optional material for continued education rather than for task training.

Doctrinal Reference for the Naval Construction Force, U.S. Navy NTRP 4-04.2.1

Enemy Prisoners of War and Civilian Internees, U.S. Marine Corps MCRP 4-11.8C

The Infantry Rifle Platoon and Squad, U.S. Army FM 3-21.8

Trainee Feedback

Center for Seabees and Facilities Engineering (CSFE) makes every effort to keep their courses up-to-date and free of technical errors. If you have a suggestion, found an error or inaccuracy, please write, FAX or email us by using the form below. Use one form for each comment and be sure to fill in the information as accurately and detailed as possible. Thank you for your assistance.

Write: CSFE
NCF Training Division (N7B)
3502 Goodspeed St.
Port Hueneme, CA 93043-4337

FAX: (805) 982-5508 / DSN 551-5508

E-mail: CSFE_CBCH@navy.mil

Trainee Feedback Form

Course: Seabee Combat Handbook, Volume ____, NAVEDTRA: _____

Course Date: _____ Chapter Number: _____ Page: _____

Paragraph: _____ Sentence: _____ Figure: _____ Frame/View: _____

Description: _____
_____
_____
_____
_____
_____

(optional) Corrective action: _____
_____
_____

(optional) Supporting reference(s): _____
_____

Your email address, if a response is requested: _____

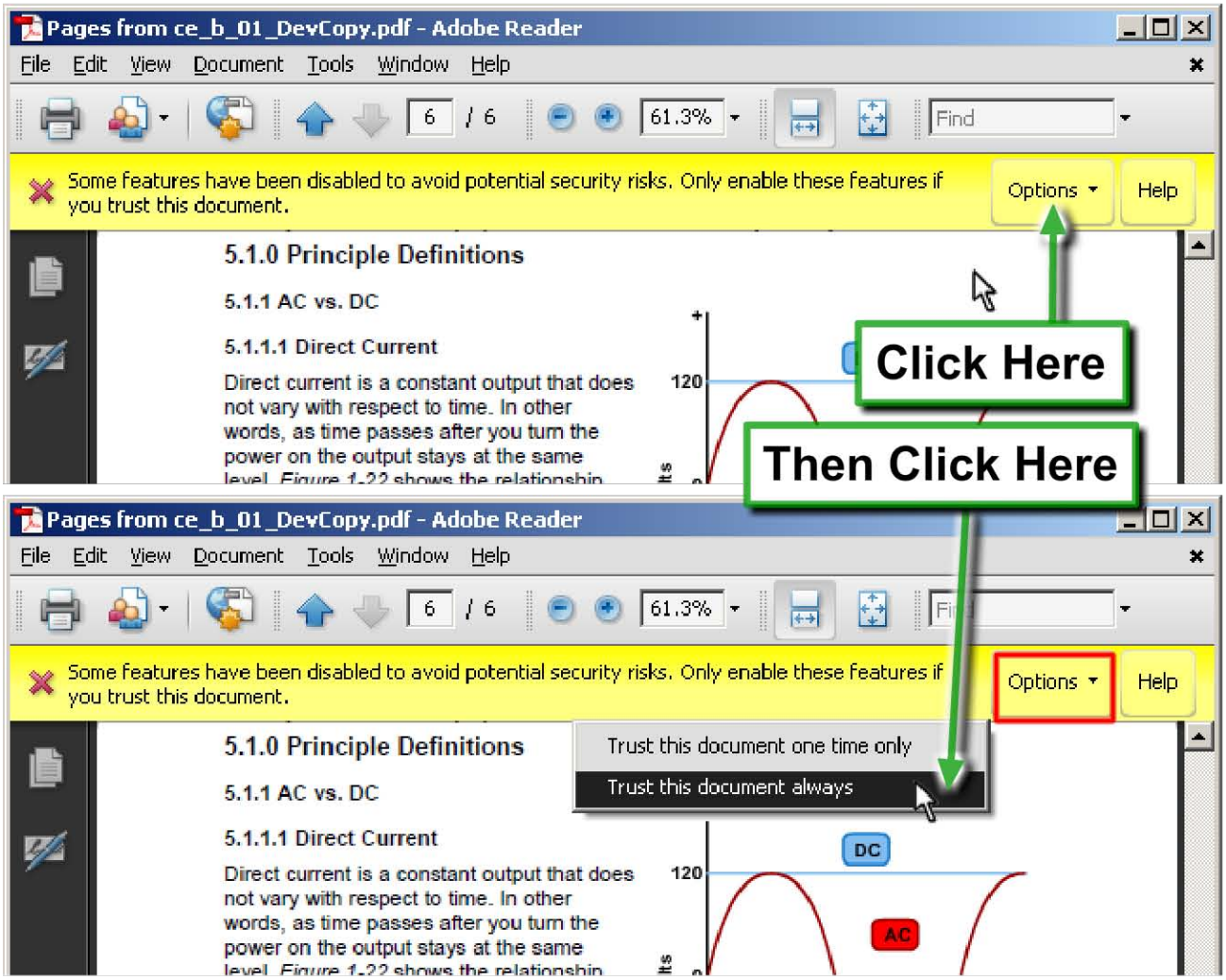
The Interactive features of this manual are currently disabled.

Many graphics will not appear correctly unless these features are turned on. You should either see a popup window, or a yellow banner at the top of the application. To enable the Interactive features of this manual follow the steps illustrated below:

If you see a popup window do the following:



If you see a yellow banner, do the following:



Once you have completed either of the above procedures the features will be enabled for this document, and this warning won't appear again after you leave this page.

Chapter 2

Organizational Clothing and Equipment

Topics

1.0.0 Navy Working Uniform

2.0.0 Load Bearing Infantry Equipment

3.0.0 Lightweight Helmet

4.0.0 Modular Tactical Vest

5.0.0 Combat Tent

6.0.0 Sleep System

To hear audio, click on the icon: 

Overview

This chapter is intended as a guide for the individual Seabee on the proper use and care of special clothing and equipment that may be issued while serving with the Naval Construction Force.

General instructions for wearing items of the uniform are included in this chapter. Uses of the sleeping bag and other equipment are discussed.

You are responsible for the use and care of clothing and equipment issued to you. It is your duty to ensure these items are available and in a serviceable condition when they are needed. A torn sleeping bag cannot provide the protection required on cold nights. Neither can your cold weather coat if it does not have buttons or a zipper. Under certain circumstances, you may be charged for the replacement or repair of items lost or damaged through carelessness. Under other circumstances, neglect may cost you your life.

Objectives

When you have completed this chapter, you will be able to:

1. Describe the characteristics of the Type II and Type III Navy Working Uniform (NWU).
2. Describe the characteristics of load bearing infantry equipment.
3. Explain the proper wear of the Lightweight Helmet (LWH).
4. Identify the components of the Modular Tactical Vest (MTV).
5. Explain the layout of the combat tent.
6. Describe the characteristics of the sleep system.

Prerequisites

There are no prerequisites for completing this manual.

Features of this Manual

This manual has several features which make it easy to use online.

- Figure and table numbers are italicized within the handbook text. Figure and table reference numbers are conveniently located next to (or near) the applicable handbook text.
- Audio and video clips are included in the text, with italicized instructions telling you where to click to activate the appropriate link.
- Review questions are included at the end of this chapter as the chapter assignment. To submit assignments log into https://www.courses.netc.navy.mil, go to “Student Services”, in the drop down click on “Active Courses”, go to "View/Submit Answers" next to the course you wish to submit answers for. Assignments may be submitted to the above Web site as they are completed, and instant scoring is available. Your completion letter is available as soon as you pass all assignments.
- A form at the end of each chapter allows your input for improving the manual or correcting errors to be brought to the attention of CSFE’s Technical Review Committee. Your input is important and will help keep this manual up to date and free of technical errors.

1.0.0 NAVY WORKING UNIFORM (NWU)

The Navy Working Uniform (NWU) Type II and Type III (*Figure 2-1*) should not be confused with NWU Type I (Blue/Gray). NWU Type I is a service utility uniform for all Sailors as part of their seabag. The NWU Type II and III are tactical uniforms for expeditionary Sailors.



Figure 2-1 — NWU Type II and Type III.

The NWU families of uniforms are intended to replace multiple and less capable legacy uniforms, reduce the Navy's total ownership costs, modernize the warfighter, and complete the vision of Task Force Uniform. The NWU Type II and III uniforms have been developed for use in the tactical expeditionary mission environment of today's Navy, tailored for desert and woodland environments.

NWU Type II—a desert digital camouflage uniform of four colors—will be worn by Special Warfare Operators and Sailors who support them.

NWU Type III—a woodland digital camouflage uniform (also with four colors)—will be the standard camouflage uniform worn in non-desert environments, including most Continental United States (CONUS) environments requiring a camouflage uniform.

NWU Type II and Type III are unisex.

NWU Type II and III were developed by Naval Special Warfare Command (NSWC) to increase the probability of mission success and survivability in combat operations.

NWU Type II and Type III are organizational clothing and will be issued only by authorized commands. The uniforms will remain the property of the issuing command.

2.0.0 LOAD BEARING INFANTRY EQUIPMENT

2.1.0 Personal Gear Issue (PGI)

All military personnel assigned to a Naval Construction Force (NCF) unit are trained in the manner and under the circumstances in which they will build and fight. Commanders must ensure that every person assigned to them has the right PGI at the right time for the right mission and must also maintain strict accountability and readiness of these critical warfighting assets.

PGI is the property of the U.S. Government; however, the individual will retain custody and accountability for PGI when transferring between units of the NCF. Commanders shall ensure accountability is transferred and protect against duplicate issues through vigorous record reviews/reconciliations and physical inspections. Thorough assessments and inspections of accountability records and physical inventories shall be a central component of all readiness and logistics inspections. Some of the examples of PGI include:

- E-tool (*Figure 2-2, Frame 1*)
- M16 magazine pouch (*Figure 2-2, Frame 2*)
- M9 magazine pouch (*Figure 2-2, Frame 3*)
- Hand grenade pouch (*Figure 2-2, Frame 4*)
- M203 pouch (*Figure 2-2, Frame 5*)
- Individual Medical Assault Kit (IMAK) (*Figure 2-2, Frame 6*)
- Smoke grenade pouch (*Figure 2-2, Frame 7*)
- Canteen (*Figure 2-2, Frame 8*)
- Weapons Cleaning Kit (*Figure 2-2, Frame 9*)
- Modular Tactical Vest (*Figure 2-2, Frame 10*)



Figure 2-2 — Personal gear issue.

PGI is separated into the following categories and marked accordingly on the PGI List.

- Standard Issue – These are items Seabees require on a continuing basis. They are issued to all hands, and include Uniform of the Day items, load-carrying gear, sleeping systems, and tents.

Interaction Available

- Mission Dependent – These are items issued to satisfy specific training, environments, roles and/or missions. For example, the M9 pistol holsters are issued only to Seabees who are issued an M9 pistol; Medical bags are issued only to Corpsmen.
- Recoverable – Items recovered from Seabees who detach from the NCF (e.g., return to the Fleet, separation, retirement, etc.) are referred to as recoverable. Recoverable items are those that retain value; can be cleaned, repaired, and reissued after use; or require demilitarization or other post-use action, which dictates that the item be recovered. Personnel detaching from the NCF shall return all Recoverable PGI and will be relieved of the associated accountability.
- Non-Recoverable –These are items Seabees require, but retain no value to the Government after use or have special restrictions or regulations. These items are not recovered when a Seabee detaches the NCF, but must be exchanged on a one-for-one basis to receive a replacement item (boots, long johns, etc.).

PGI that has become unserviceable due to normal use shall be replaced on a one-for-one basis. Pay adjustment is the most convenient method for Seabees to use to reimburse the Government for PGI items that have been lost, damaged, or destroyed due to individual negligence. In some cases of individual negligence, commanders may determine disciplinary action may also be appropriate. Permanently marking PGI with individual names, rates, ranks, and other individual markings is prohibited.

2.2.0 Combat Field Pack (CFP)

The CFP is a light weight (8 pounds empty) field pack that replaces the Modular Lightweight Load-carrying Equipment (MOLLE) pack in the NCF Table of Allowance.

The CFP has an internal frame comprised of two removable aluminum staves running the full height of the field pack. The covering is constructed of backcoated nylon CORDURA® fabric printed in the woodland camouflage pattern. (*Figure 2-3*)



Figure 2-3 — Combat field pack and patrol pack.

2.2.1 Carrying Capacity

The CFP offers water repellent cargo space in two major sections:

- Main compartment
- Sleeping bag compartment

The main compartment has a false bottom that may be opened for full use of the field pack when a sleeping bag is not carried. The outside of the CFP has one long tunneled pocket and two smaller cargo pockets, all having compression straps for securing contents. 2-1/4-inch webbing and 1-inch webbing loops are located throughout the pack to attach equipment.

2.2.2 Suspension System

The CFP is adjustable allowing the user to position the field pack where it is most comfortable. The field pack has lower back padding as well as an extended lumbar support pad and the shoulder pads are made of bi-laminate foam. Softer, open cell foam is against the body for comfort followed by stiffer closed cell foam for stability and good recovery after compression.

2.3.0 Combat Patrol Pack (CPP)

The optional CPP (*Figure 2-3*) is designed for short missions and offers 1,200 cubic inches of cargo capacity in two compartments. The CPP has a separate shoulder harness and may be used in conjunction with the CFP.

3.0.0 LIGHTWEIGHT HELMET (LWH)

The LWH (*Figure 2-4*) provides improved performance with reduced weight over the previously issued helmets. The base material of the helmet is a state-of-the-art composite material using a unique construction resulting in increased ballistic protection. The adjustable 4-point retention and suspension system allows for several adjustments to achieve a snug and comfortable fit. In addition to the head band crown mesh suspension, a pad suspension system is installed in helmets manufactured after January 2007.

The use of a nape pad in the 4-point retention makes the helmet very stable, even when using add-on Night Vision Goggles (NVG) or other optical devices. The LWH integrates with a nape protector, FS-40 Faceshield, Ballistic Maxillofacial Shield, GenCom III™ Headset and General Duty Headset for tactical communications and increased protection.

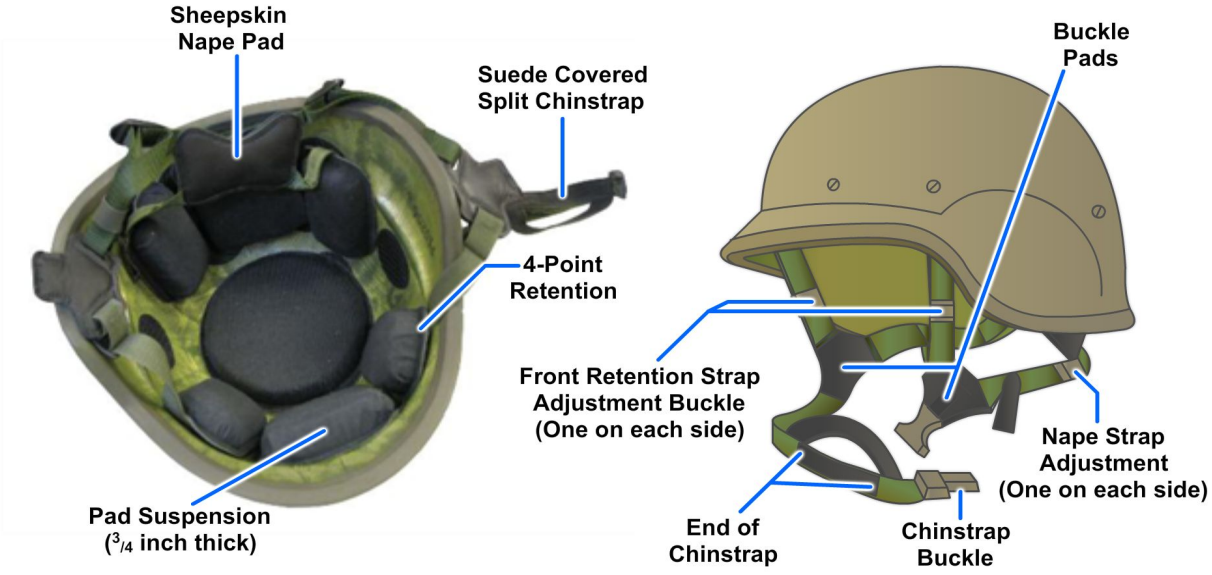


Figure 2-4 — Lightweight Helmet.

Proper fit is essential for the effective and safe use of the LWH. The LWH is available in six sizes; be sure to take all three measurements as shown in *Table 2-1.*

Table 2-1 — Sizing parameters

Helmet Size	MEASUREMENTS - inches up to maximum		
	Head Length	Head Width	Head Circumference
X-Small	7-1/8	5-5/8	20-7/8
Small	7-1/2	5-7/8	21-3/4
Medium	7-3/4	6-1/8	22-1/2
Large	8-1/8	6-1/4	23-1/4
X-Large	8-5/8	6-7/8	24-1/4
XX-Large	Larger than 8-5/8	Larger 6-7/8	Larger than 24-1/4

3.1.0 Checking Helmet Fit

To check the helmet fit, you must (1) don the helmet and adjust the retention and the chinstrap, (2) evaluate the fit, (3) troubleshoot the fit (if necessary) to eliminate any problems, and (4) become familiar with alternate pad configurations.

3.1.1 Donning Helmet

WARNING

Ensure that all helmet adjustment mechanisms are properly adjusted for a snug, secure fit at all times when the helmet is worn. Failure to do so can result in an unstable helmet and may result in injury.

Do the following:

1. Ensure that the suspension pads are arranged in the standard pad configuration. If other equipment is to be used with the helmet, such as a headset, evaluate size with that equipment (if possible).
2. Don the helmet.
    a. Ensure that the buckle pads are below the earlobes. If the buckle pads cover the earlobes, lower the front retention strap buckles until the buckle pads are below the earlobes.
    b. Buckle the chinstrap.
    c. Adjust the nape straps for a snug, secure, comfortable fit at the nape.
    d. Tighten the chinstrap by pulling on the hook ends of the chinstrap until the fit is snug, secure, and comfortable. Reattach the ends to the pile fastener when the desired fit is attained.
    e. Check the helmet stability by attempting to rock the helmet back and forth on the head. If the helmet rocks back and forth, it is not stable. Adjust the nape strap further until the helmet is stable.
    f. If the buckle pads cover the earlobes when the nape strap is adjusted, lower the front retention strap buckles until the buckle pads are below the earlobes. Repeat steps as necessary. Recheck helmet stability; no straps should be loose.

3.1.2. Evaluating the Fit

The helmet should not be too high (crown pad does not contact the head or too much of forehead is exposed), too low (too low on brow or not compatible with eyewear, etc.), too tight, or too loose. Shake head rapidly from side to side to check for stability. The helmet should not rotate from side to side when head is shaken.

When donning the helmet for the first time in a cold environment, it is necessary to wear the helmet for a few minutes or otherwise warm the pads, such as by placing in pockets, so that the pads will conform to the shape of your head. As the pads warm up and conform to the shape of your head, it may be necessary to re-tighten the chinstrap and the retention system.

3.1.3 Troubleshooting the Fit

Sizing and fitting troubleshooting techniques:

- If the helmet is too tight try arranging the oblong (smallest) pads in a horizontal configuration or diagonal direction. If rearranging the pads does not alleviate the tightness, try the next larger helmet size.
- If the helmet is too loose, that is, if it slides when you shake your head from side to side try a thicker pad set. Remove the 3/4-inch-thick pads from the helmet (except the crown pad) replace them with the 1-inch-thick pads.

NOTE

Only 3/4-inch-thick crown pads are available. If replacing the pads does not alleviate the tightness, try the next smaller helmet size.

- If the helmet is too high. The helmet is too high if it sits more then1/2-inch above the eyebrow, if the crown pad does not touch the top of the head, or if the wearer does not see the edge of the rim. Try rearranging pads (horizontal or diagonal). If rearranging the pads does not alleviate the problems, try the next larger size helmet.
- If the helmet is too low. If the helmet is too low on the brow, not compatible with eyewear, or has other compatibility issues try rearranging pads (horizontal or diagonal). If available, try a thicker pad set. Remove the3/4-inch-thick pads (except the crown pad) from the helmet; replace them with the 1-inch-thick pads. If the thicker pads are not available try the next smaller size helmet.

4.0.0 MODULAR TACTICAL VEST (MTV)

The MTV (*Figure 2-5*) is a body armor system that incorporates a load bearing capability and superior protection. When assembled properly, the MTV distributes the fighting load and allows the Seabee greater freedom of placement of ancillary items.



Figure 2-5 — Modular Tactical Vest.

4.1.0 Inventory

Upon receipt of the MTV, the Seabee will conduct an inventory of the vest utilizing the provided KwikPoint Reference card located in the rear plate pocket. This is required to ensure the presence of the following items:

- Front carrier and soft armor insert
- Rear carrier and soft armor insert and spine armor insert
- Side Enhanced Small Arms Protective Insert (ESAPI) pouches with soft armor inserts
- Groin armor carrier and soft armor insert
- Collar/yoke assembly
- Throat armor assembly
- Right and left cummerbund assemblies
- Two cummerbund stays
- Bungee cord, one wrap, and barrel lock
- Medical Evacuation (MEDEVAC) strap
- Rifle bolster

4.2.0 Inspection

After completing the inventory, an inspection is required to ensure the vest is ready for wear in combat. Inspect the following items:

- Front and rear carrier for rips and tears – Ensure plate pockets are not sewn down.
- Inspect all soft armor components for tears or permeating stains associated with exposure to petroleum products.
- Check right and left cummerbund assemblies and ensure that the white DACRON® loops are not frayed or the side plate pockets are not sewn shut.
- Inspect the collar and yoke assemblies for tears.
- Check all SAPI/ESAPI plates for tears that expose ballistic material and obvious dents or holes. If any are present, the plate is unserviceable. Perform a “four corner” check on all SAPI/ESAPI plates by grasping opposing corners and LIGHTLY attempt to “Twist.” If a plate flexes or you here a “crunching” noise, the plate is unserviceable. Shake the plate. If you hear “rattling” of material, the plate is unserviceable. Inspect SAPI/ESAPI plates biweekly (operationally dependent).

4.3.0 Assembly

Once inspected and the MTV passes, it is time for assembly. Pay particular attention to the following areas of the MTV:

- Front/Rear Carrier Assemblies
- Throat and Collar Assemblies
- Cummerbund Assemblies
- Fitting
- Final Assembly

5.0.0 COMBAT TENT

The Tent Combat One Person (TCOP) (*Figure 2-6*) incorporates all of the important features required for living in the field, including the ability to keep users dry; fast and easy set up; and tough fabric that will last. The TCOP has a full coverage fly with blackout fabric, two vestibules for covered gear storage, and two large drop-down doors with mesh windows. The entire upper body is constructed of breathable nylon for control of condensation. Each TCOP is designed using durable materials that meet or exceed Government requirements and is warranted to stand up to repeated field use.



Figure 2-6 — TCOP.

The following is a list of TCOP characteristics:

- Floor area: 28 sq. ft. main tent body
- Weight: 6 lbs. 7 oz. (tent, fly, and frame)
- Height: 32.5" (+/-1")
- Vestibule area: Two vestibules 17+ sq. ft. minimum
- Tent body: Flame retardant, 70D, 98P polyurethane-coated ripstop nylon containing two large drop-down doors with mesh windows
- Rain fly: Reversible to desert tan (woodland camo or digital camo available), flame retardant, full coverage blackout material with taped seams; two vestibules
- Netting: 40D nylon “no-see-um” for protection from dust and small insects
- Frame: Easy shockcorded, cold weather, black anodized aluminum frame (.344” diameter)
- Repair kit: Including one-piece frame repair sleeve, needle, thread, thimble, one set of extra guylines, 12’ cold weather shockcord with ‘shoklocs’, 12”x12” swatches of all fabric and replacement toggles, buckles, tapes, and web included with each tent

6.0.0 SLEEP SYSTEM

The sleep system (*Figure 2-7*) is designed to insulate the user in environments ranging from mild weather to extremely cold weather. The system consists of two mummy-style sleeping bags, the patrol (green) and the intermediate cold weather (black). Each is constructed of water-resistant, ripstop nylon. Each sleeping bag is fully independently functional. For a temperature to -30°F, insert the intermediate cold weather bag inside the patrol bag. Each bag is compatible with the vapor permeable bivy cover. When all three components are used together, the system is rated to provide four hours of sleep at -40°F. A compression stuff sack and bivy cover is also included.

Patrol Bag features:

- Temperature to +30°
- Non-flammable and machine-washable
- Reversible double-pull (opens end to end) slider allows top or bottom ventilation
- Non-locking slide fastener self repairs if jammed or snagged
- Draft flap prevents heat loss
- Hood adjusts for heat retention; includes nylon draw cord and barrel lock



Figure 2-7 — The sleep system.

- Measures 24” x 92” to 37” x 92”
- Green in color

Intermediate Cold Weather Bag features:

- Temperature to -10°
- Free from cold spots
- Insulation does not migrate in the bag
- Anatomically designed foot box contains twice the insulation as the bag
- Sewn-in quilted chest collar prevents air drafts up and down through the hood
- Hood adjusts for heat retention; includes nylon draw cord and barrel lock
- Measures 23” x 87” to 35 ½” x 87”
- Black in color

Stuff Sack features:

- Compressible to one cubic foot
- Six, one-inch-wide nylon webbing straps adjust by ladderlock buckles
- Reinforcement webbing is sewn around the circumference of the bag
- Nylon draw cord closure with a barrel lock
- Measures 30" in length; 14" in diameter
- Black in color

Bivy Cover features:

- Made of durably waterproof and windproof 3-layer GORE-TEX® fabric and approved by all departments and agencies of the Department of Defense
- Includes snap fastener and slide fastener
- Measures 85" x 28" x 35"
- Woodland pattern

Summary

In this chapter, you were introduced to the NWU Type II and III, the TCOP, and the sleep system. The different types of NWU were discussed. You learned why there are so many different types and which one is used for what type of environment. The topic on load bearing infantry equipment provided you with information on PGI, the four categories of PGI, the CFP, and CPP. The lightweight helmet was covered—specifically, how to properly wear it. You learned about the MTV, its various components, and the inspection criteria to ensure it is ready for a combat environment. Finally, you learned about the sleep system—how the different components work together to provide warmth and comfort while sleeping is important. You learned about the care and maintenance of the different types of equipment you could be issued when deploying and the responsibilities associated with having that gear. It is important for you to know how to properly wear and care for this equipment because in the field, it may be all you have. Its fit and function can mean the difference between life and death.

Assignment 2

Objectives

1. Describe the characteristics of the Type II and Type III Navy Working Uniform (NWU).
2. Describe the characteristics of load bearing infantry equipment.
3. Explain the proper wear of the Lightweight Helmet (LWH).
4. Identify the components of the Modular Tactical Vest (MTV).
5. Explain the layout of the combat tent.
6. Describe the characteristics of the sleep system.

Questions

1. The NWU Type II and III are what type of uniforms?

    1. Command
    2. Tactical
    3. Staff
    4. Utility

2. What type NWU is a woodland digital camouflage uniform of four colors?

    1. I
    2. II
    3. III
    4. IV

3. What command developed the NWU Type II and III uniforms?

    1. Naval Special Warfare Command (NSWC)
    2. Navy Expeditionary Combat Command (NECC)
    3. FIRST Naval Construction Division (1NCD)
    4. Center for Naval Special Warfare (CNSW)

4. What type NWU is issued to all Sailors as part of their seabag?

    1. I
    2. II
    3. III
    4. IV

5. Who retains custody of PGI when Seabees transfer between units of the NCF?

    1. Transferring command
    2. Gaining command
    3. NCF supply system
    4. Individual Seabee

6. Which of the following categories of PGI consist of those items that retain value; can be cleaned, repaired, and reissued after use; or require demilitarization or other post-use action?

    1. Standard Issue
    2. Mission Dependent
    3. Recoverable
    4. Non-Recoverable

7. The CPP offers how many cubic inches of cargo space?

    1. 800
    2. 1,000
    3. 1,200
    4. 1,400

8. The LWH is made up of what primary material?

    1. State-of-the-art composite
    2. Steel
    3. Impact resistant resin
    4. Titanium

9. When evaluating the fit of the LWH, how does the wearer check for stability?

    1. Pull on either side of the chinstrap
    2. Attempt to twist the helmet while keeping the head straight
    3. Attempt to push the helmet down over the eyes
    4. Shake head rapidly from side to side

10. When donning the LWH for the first time in a cold environment, what must be done to ensure the pads conform to the shape of your head?

    1. Replace with larger pads
    2. Replace with smaller pads
    3. Warm the pads
    4. Add additional pads

11. One of the advantages of the MTV is its capability for what type of freedom?

    1. Movement of arms
    2. Access to shirt under the vest
    3. Placement of ancillary items
    4. Ability to remove impact panels

12. Where is the KwikPoint Reference card found for the MTV?

    1. Rear plate pocket
    2. Left ESAPI pouch
    3. Right ESAPI pouch
    4. Front plate pocket

13. How often should the SAPI/ESAPI plates be inspected?

    1. weekly
    2. biweekly
    3. monthly
    4. bimonthly

14. The TCOP contains how many vestibules?

    1. 1
    2. 2
    3. 3
    4. 4

15. The TCOP provides how many square feet of living space?

    1. 20
    2. 21
    3. 24
    4. 28

16. The sleep system is a combination of how many different sleeping bags?

    1. 2
    2. 3
    3. 4
    4. 5

17. The sleep system is rated to provide protection against temperatures down to how many degrees Fahrenheit below zero?

    1. 10
    2. 20
    3. 30
    4. 40

ASSIGNMENT 2

Organizational Clothing and Equipment

Directions: Select the correct answer from the list of alternates below each question in the end of chapter assignment. Write in the answer next to the corresponding question number below. Use this answer sheet as a reference to completing the online assignment related to this assignment.

1.	
2.	
3.	
4.	
5.	
6.	

7.	
8.	
9.	
10.	
11.	
12.	

13.	
14.	
15.	
16.	
17.	

Additional Resources and References

This chapter is intended to present thorough resources for task training. The following reference works are suggested for further study. This is optional material for continued education rather than for task training.

This is your Ballistic Helmet, U.S. Army Soldier and Biological Chemical Command Natick Soldier Center

Modular Tactical Vest, User's Guide, Protective Products International

USMC Modular Tactical Vest Assembly Guide, USMC Program Manager, Infantry Combat Equipment

Operator’s Care and Use Manual for Lightweight Helmet (LWH), U.S. Army TM 08744B-12&P

Navy Working Uniform Type I, II, and III, Camouflage Utility Uniforms, U.S. Navy NAVADMIN 259-11

General Repair Procedures for Indivdiual Equipment, U.S. Army TM 10-8400-203-23&P

Eureka Military Tents, http://military.eurekatents.com/tents/tcop.cfm

Trainee Feedback

Center for Seabees and Facilities Engineering (CSFE) makes every effort to keep their courses up-to-date and free of technical errors. If you have a suggestion, found an error or inaccuracy, please write, FAX or email us by using the form below. Use one form for each comment and be sure to fill in the information as accurately and detailed as possible. Thank you for your assistance.

Write: CSFE
NCF Training Division (N7B)
3502 Goodspeed St.
Port Hueneme, CA 93043-4337

FAX: (805) 982-5508 / DSN 551-5508

E-mail: CSFE_CBCH@navy.mil

Trainee Feedback Form

Course: Seabee Combat Handbook, Volume ____, NAVEDTRA: _____

Course Date: _____ Chapter Number: _____ Page: _____

Paragraph: _____ Sentence: _____ Figure: _____ Frame/View: _____

Description: _____
_____
_____
_____
_____
_____

(optional) Corrective action: _____
_____
_____

(optional) Supporting reference(s): _____
_____

Your email address, if a response is requested: _____

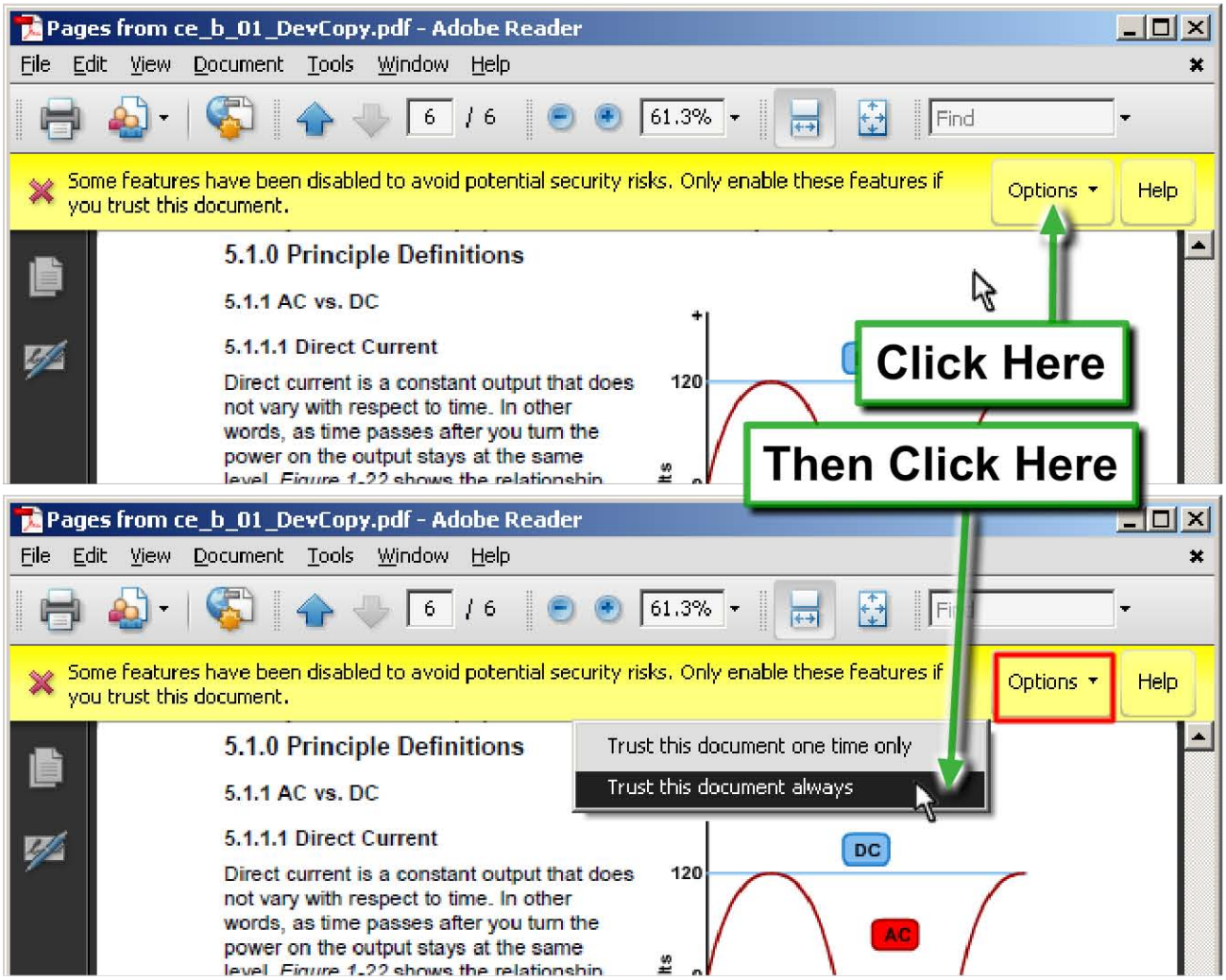
The Interactive features of this manual are currently disabled.

Many graphics will not appear correctly unless these features are turned on. You should either see a popup window, or a yellow banner at the top of the application. To enable the Interactive features of this manual follow the steps illustrated below:

If you see a popup window do the following:



If you see a yellow banner, do the following:



Once you have completed either of the above procedures the features will be enabled for this document, and this warning won't appear again after you leave this page.

Chapter 3

Organic Communications Equipment

Topics

1.0.0 Means of Communication

2.0.0 Responsibilities

3.0.0 Communications

4.0.0 Field Message Format and Preparation

To hear audio, click on the icon: 

Overview

Communication is the voice of command. Without the equipment to provide rapid, reliable, secure, and efficient tactical communications, a commander in the field cannot effectively exercise command and control of his forces, call in available fire support, or maintain adequate channels of logistics. In battle, poor communications cost lives. On a construction project, inefficient communications cost time, money, and material; however, even the most advanced and sophisticated communication system is of little consequence in the hands of untrained personnel. Either by design or through necessity, any one of us, as Seabees, could be called upon to use the command's tactical communications equipment in an emergency; therefore, it is important to be familiar with the communications systems in this chapter. Know what each system does, how it works, and when and where to use it. The intent of this chapter is to do just that. Do not be a liability to your shipmates. A well-rounded understanding of communications by all hands greatly upgrades the overall operational efficiency of the command.

Objectives

When you have completed this chapter, you will be able to:

1. Recognize the fundamentals of tactical combat communications.
2. Identify the radio and telephone sets in general use in the Naval Construction Force, their characteristics, components, and operating procedures.
3. Select the correct definitions of terms pertaining to radio and telephone communicating procedures.
4. Identify principles of communications by messenger and signals.

Prerequisites

There are no prerequisites for completing this manual.

Features of this Manual

This manual has several features which make it easy to use online.

- Figure and table numbers are italicized within the handbook text. Figure and table reference numbers are conveniently located next to (or near) the applicable handbook text.
- Audio and video clips are included in the text, with italicized instructions telling you where to click to activate the appropriate link.
- Review questions are included at the end of this chapter as the chapter assignment. To submit assignments log into https://www.courses.netc.navy.mil, go to “Student Services”, in the drop down click on “Active Courses”, go to "View/Submit Answers" next to the course you wish to submit answers for. Assignments may be submitted to the above Web site as they are completed, and instant scoring is available. Your completion letter is available as soon as you pass all assignments.
- A form at the end of each chapter allows your input for improving the manual or correcting errors to be brought to the attention of CSFE’s Technical Review Committee. Your input is important and will help keep this manual up to date and free of technical errors.

1.0.0 MEANS OF COMMUNICATION

The most common means of communication is simply speaking to one another—voice communication. When you need to communicate over longer distances, your voice can be transmitted and received by electrical means, such as radio or telephone. Other means of communicating by sound are by whistles, sirens, horns, gunfire, and so forth. Messages may also be communicated through visual means (hand signals, smoke, and flags) and in writing (orders, messages, and reports).

Effective communication is essential for control of the company and its elements. The company uses a combination of radio, wire, messenger, visual, and sound communications to provide as many ways to transmit messages as conditions permit. Radio is the primary means of communication in all tactical, on-the-move operations. Communications (COMM) wire is the primary system used during a static defense.

Each commander is responsible for the installation, operation, and maintenance of their unit's communication system and for its efficient operation as a part of the next higher unit's system. Each commander exercises tactical and technical supervision over the communication system of all the units of the command.

2.0.0 RESPONSIBILITIES

Every Seabee is responsible for good communications. The importance of passing the word **CANNOT** be overemphasized. Knowing what is happening and what is expected aids in achieving a successful mission. You must develop good, two-way communications both up and down the chain of command if you are to stay alive in combat. The responsibility for communication among units is subject to the following general rules:

1. The higher unit is responsible for establishing communication with the next lower unit and attached units.
2. A unit supporting another unit establishes two-way communication with that unit.
3. Unless directed by higher authority, lateral communication between adjacent units is established and maintained by the unit on the left and transmitted to the unit on the right.
4. Although one unit is specifically charged with establishing and maintaining communications with another unit, only through the mutual efforts of all the members of each unit can continual communications be maintained.
5. The company commander is responsible for the installation, operation, and maintenance of the company communications system and for its efficient operation as part of the command system. Instructions about all communications are found in the Operation Orders (OPORDs).

3.0.0 COMMUNICATIONS

Radio and messengers are the primary means of communication for offensive combat and for other operations involving rapid or extensive movement. These methods may be supplemented by visual and sound signals. As a Seabee, you normally use the radio as the main source of communication while on a convoy because most of your vehicles have radios mounted in them.

Normally, wire and messengers are the primary means of communication in defense. Radio is used when wire service is interrupted after the enemy has made contact or

when ordered by a higher command. Two or more wire lines should be installed over different routes to connect two units. This allows communication to be quickly reestablished if one line goes out. Visual and sound signals may be used to supplement wired connections but only when they do not compromise security.

Visual signals include panel sets, pyrotechnics, smoke of various types and colors, arm and hand signals, flashlight, tracer ammunition, improvised lights, and flags. Higher headquarters normally prescribes the use of pyrotechnics or smoke signals to call for shift, lift, fire, or illumination.

Sound signals are normally used for alarms to warn of air, Chemical, Biological and Radiological (CBR), or ground attack. Whistles, horns, bells, small arms, or other noisemakers may be used for sound signals.

No matter what type of communication is used, assume that you are being monitored by the enemy. This is particularly true of radio, which is the **LEAST** secure means of communication.

The radios, telephone, and the switchboard discussed in this section are those presently on the Naval Construction Force (NCF) Table of Allowance (TOA). To help you understand the component nomenclature and their family names, the following examples are provided.

AN/PRC-119 and AN/PRC-150 radios

1. **AN** indicates the users (Army/Navy).
2. **P, V** and **G** indicates the type of installation (pack/ portable, vehicular, ground).
3. **R** indicates the type of equipment (radio).
4. **C** indicates the purpose (communications).
5. Numbers 119 and 150 indicate the model numbers.

TA-312/PT

1. **TA** indicates the type of equipment (telephone apparatus).
2. Numbers 312 indicate the model numbers.
3. **P** indicates the type of installation (pack, portable).
4. **T** indicates the type and purpose of the equipment (telephone [wire] transmitting).

SB-22/PT switchboard

1. **SB** indicates the type of equipment (switchboard).
2. Number 22 indicates the model number.
3. **P** indicates the type of installation (pack, portable).
4. **T** indicates the type and purpose of the equipment (telephone [wire] transmitting).

3.1.0 Radios

3.1.1 AN/PRC-119 Radio

The AN/PRC-119 (*Figure 3-1*) is also known as the Single Channel Ground and Airborne Radio System (SINCGARS) radio. It is a lightweight combat radio that serves as the primary means of communications for command, control, and fire support on the battlefield. The SINCGARS is an FM radio that operates at the lower end of the Very High Frequency (VHF) range from 30 to 87.95 Megahertz (MHz).



Figure 3-1 — SINCGARS AN/PRC-119 radio.

The radio can operate on a Single Channel (SC) mode, transmitting and receiving either voice or digital data. To reduce the potential threat of jamming by the enemy, the radio is capable of operating in a Frequency Hopping (FH) mode. In this mode, the radio randomly "hops" from frequency to frequency 100 times per second.

Other capabilities of the SINCGARS radio include:

- Cryptographic operation – provides for secure communications.
- Remote operation – allows radio to be operated from a remote location
- Retransmission – extends distance capabilities

The radio is also capable of changing the output levels of the signals it transmits. This provides an additional level of security by limiting the enemy's ability to detect battlefield communications. Operators can select the power setting based upon the following distances:

- LO – lower power: Up to 400m
- M – medium power: Up to 5km
- HI – high power: Up to 10km
- PA – Power Amplifier: Up to 40km (when using the AM-7239 amplifier)

3.1.1.1 Components

The SINCGARS radio, manpack configuration, consists of the equipment listed below:

- Receiver-Transmitter (RT)
- Handset
- Manpack Antenna
- Battery Box
- Battery
- Field Pack

3.1.1.1.1 Receiver-Transmitter (RT)

The RT is the heart of the SINCGARS radio. It contains all of the knob and switch features the operator needs to select during operational modes. The keypad in the center of the unit enables the operator to manually enter and store the desired operating frequency and other operational information. The keyboard display shows a variety of information to the operator. It displays single channel frequencies, error messages, FH data, data rates, etc. It also responds to keyboard entries according to the operation being performed. The keyboard is used for entering, holding, and checking data.

3.1.1.1.2 Handset

The handset, used in conjunction with the SINCGARS radio, is the standard military type H-250. A push-to-talk button on the right side of the unit (when held in right hand) will key the transmitter. On the rear is a clip that allows the handset to be attached to the shoulder strap when not in use.

3.1.1.1.3 Manpack Antenna

The manpack antenna is a 41-inch unit (commonly called the 3-foot tape) that connects to the radio via a gooseneck adapter that permits the operator to orient the antenna for best reception. Also shown is an extendible 10-foot whip antenna constructed of interconnected segments that piece together end-to-end. It is usually used when transmitting over longer distances, and when concealment is not a primary concern. When not in use, it is kept folded and stored in the field pack.

3.1.1.1.4 Battery Box

The battery box connects electrically to the bottom of the RT via a systems connector on the rear of the RT. The battery box is secured in place by latches on either side of the RT.

3.1.1.1.5 Battery

The SINCGARS radio uses rechargeable, 13.5 volt Direct Current (DC), Nickel Metal Hydrate (NiMH) BB-390A or BB-390BU type batteries. The BB-390A, will provide power for 8 to 18 hours, and the BB-390BU will provide 12 to 24 hours of power, depending upon usage.

3.1.1.1.6 Manpack

The field pack is worn over the shoulders. The radio is placed inside the pack, battery-box down. When worn, the handset cord will protrude from the right side of the pack and the antenna from the left.

3.1.1.2 Controls and Features

The SINCGARS radio demands more from an operator besides turning the radio on. The operator is tasked with entering data using the keyboard, turning knobs, and following instructions from the net control station.

NOTE

Any time the operator moves a switch to a setting with a box around the letters, the knob must first be pulled before it is turned. This feature ensures that the knob is not accidentally moved to another position.

In order to operate the radio, operators need to understand the terminology of the radio so when they receive instructions over the radio, they can follow them. Additionally, knowing the primary function of each control will aid the operator in achieving a properly functioning radio. The different buttons/switches and their functions are listed below:

- Receiver-Transmitter (RT) – most of the controls that the operator will use are placed on the face of the RT.
- FCTN (function) Switch – sets the RT function.
- SQ ON (squelch on) – turns on the RT and the squelch. This feature will prevent the rushing noise from being heard in the handset/helmet. This is the normal operating position for the SINCGARS radio.
- SQ OFF (squelch off) – turns on the RT but not the squelch. This position is used when communicating in the SC mode with radios having a different squelch system.
- STBY (stand by) – cuts the primary (battery/vehicle) power to the RT. The RT's battery (hub battery) will maintain the memory of the radio including frequencies and times. This position is used as an alternative to OFF when the operator is concerned about conserving power during non-operating periods, but wants to retain all of the data loaded for operations occurring in the near future (same day).
- TST (test) – conducts a self-test of its internal circuits. At the completion of the test, the radio will display results. Whenever the radio is put into operation, the operator should conduct a self-test.
- LD (load) – allows the operator to load frequencies, data, and communications security (COMSEC) into the radio. In order to load any of this information into the radio for use, the operator must ensure that LD is positioned so the radio will receive the input.
- OFF – turns off all of the power to the RT. When the radio is in the OFF position for more than five seconds, the memory is completely cleared. This switch is used when it is the operator's intent to take the radio completely out of action.
- Mode Switch – sets the RT mode. The mode switch has three settings that allow the operator to select the mode of operation.
- SC (single channel) – places the RT in the SC mode of operation.
- COMSEC Switch – sets the RT to the COMSEC mode. This switch has five (5) settings that allow the operator to use or manage COMSEC data.
- PT (plain text) – placing the switch at this setting places the RT in the plain text—not a secure mode of transmission.

- CT (cipher text) – this setting allows the operator to use cipher, secure, transmissions when placed to this position.
- CHAN (channel) Switch – selects manual, preset, or cue frequencies. Operating this switch allows the operator access to any of the frequencies loaded into the channels. This switch is how the operator changes frequencies that are preset.
- MAN (manual) – selects the loaded manual frequency. The manual frequency is used during FH operations.
- CUE – this setting selects the loaded CUE frequency. This frequency is also used in FH operations.
- 1 through 6 (channel selection button). – These are the channels that may be loaded with operating frequencies or hopsets. COMSECs are also loaded into these channels.
- RF Switch – adjusts power level of transmissions. As earlier discussed, the SINCGARS has a variable power output. This is the switch that enables the operator to change the power output of the radio.
- DIM Control – adjusts display brightness. The knob is turned clockwise to brighten the display and counterclockwise to dim the display.
- VOL/WHSP (volume/whisper) control – adjusts audio volume. Turn clockwise to increase the volume, counterclockwise to decrease volume. Pulling the knob out allows the operator to receive as normal, but gives the operator the additional feature of being able to talk very softly and still transmit.
- Keypad Display – used for entering, holding, and checking data. By using the knobs and the keyboard at the same time, the operator is able to complete all functions required when operating the radio. The keypad is similar to a telephone keypad. Some of the keys have dual functions.
- FREQ (frequency) Button – used to check the data entered in the RT. Additionally, this button is used to load and clear the frequencies.
- STO (store) Button – used for data loading. Pushing this button when required transfers data from the holding (temporary) memory to the permanent memory. When loading Electronic Remote Fill (ERF) data this button is used.
- LOAD Button – used to load information into the holding memory and retrieve information from the permanent memory into the holding memory.
- CLR (clear) Button – clears data from the keyboard display if a mistake was made.
- Number Buttons – used to enter numerical data such as SC frequencies and channel numbers.
- AUD/FILL (audio/fill) Connector – located in the upper right corner, connects to fill devices or handsets. When loading FH data or COMSEC data, the fill device is hooked to this connector via a cable. Handsets can be attached to this connector as necessary.
- AUD/DATA (audio/data) Connector – located in the lower right corner, connects to external data devices during data operations and handsets during normal operations.

- ANT (antenna) Connector – located in the upper left corner, connects to the manpack antenna or vehicle antenna cable. If the RT is to be functioning with PA, the antenna connector connects the RT to the PA. The PA will connect to the antenna.

3.1.1.3 Assembly of the AN/PRC-119

When you receive the AN/PRC-119, it may need to be assembled. If this is the case, use the steps listed below.

1. Visually inspect battery box for dirt and damage. If the battery has been previously used, note battery life if it is written on the battery.
2. Stand RT on front panel guards; place battery box on RT and secure it to latches.
3. Place battery in battery box and mate connectors.
4. Close battery box cover and secure latches.
5. Return radio to upright position.
6. Screw whip antenna into base and (only) hand tighten.
7. Carefully mate antenna base with RT antenna connector. Make sure you line up the grooves and tighten by hand only. It is important not to tighten by other means.
8. Attach handset by lining up red dots and then pressing and turning clockwise.

3.1.2 AN/VRC-90D Radio

The radio set, AN/VRC-90D (*Figure 3-2*), is a basic radio set which requires operating components that are part of a requisite Installation Kit (IK) unique to each platform.

The AN/VRC-90D consists of the equipment listed below:

- Receiver-Transmitter (RT) (RT-1523E)
- Mounting Base (MB) (MT-6352/A)
- Vehicular Amplifier Adapter (VAA) (AM-7239E)
- Vehicular Antenna (AS-3900/3916)
- Handset (HS) (H-250)
- Loudspeaker (LS) (LS-671)
- Power Amplifier (PA) (AM-7238/A/B)
- Cable (W2), connects RT ANT to PA, and Cable (W4), connects RT to VAA
- Antenna Cable (CG-3856)
- Loudspeaker Cable (CX-13292)
- Power Cable

The radio set operational range is up to 30 miles Line of Site (LOS).



Figure 3-2 — AN/VRC-90D.

3.1.3 AN/PRC-150 Radio Transceiver

The AN/PRC-150 radio (*Figure 3-3*) provides units with state of the art High Frequency (HF) radio capabilities in support of fast moving, wide area operations. HF signals travel longer distances via ionosphere or skywave. The AN/PRC-150 radio systems provide



Figure 3-3 — AN/PRC-150.

units with Beyond Line of Sight (BLOS) communications without having to rely on satellite availability on a crowded communications battlefield. The systems' manpack and vehicular configurations ensure units have reliable communications while on the move, and allow for rapid transmission of data and imagery.

The AN/PRC-150 has the following characteristics and capabilities.

- Frequencies range from 1.6–30 MHz using skywave modulation with selectable low, medium, and high output power. It also operates from 20–60 MHz FM with a maximum output of 10.0 watts.
- This RT can be configured in manpack, mobile, and fixed station configurations.
- Embedded Type I COMSEC allows secure voice and data communications between ground and aircraft.
- Programmable system presets for "one-button" operation.
- Internal tuning unit matches a wide variety of whip, dipole, and long-wire antenna automatically.

The AN/PRC-150 is also capable of data communications by utilizing the TacChat and Wireless Messaging Terminal (WMT) software.

3.1.4 AN/PRC-117F Manpack Radio

The AN/PRC-117F (*Figure 3-4*) is an advanced multiband/multi mission manpack radio that provides reliable tactical communications performance in a small, lightweight package that can maximize user mobility. The AN/PRC-117F is a multiprocessor-based, fully digital, software-controlled, voice, and data transceiver. The AN/PRC-117F is capable of providing LOS, SATCOM, ECCM, FH operations (SINCGARS and HAVEQUICK [a frequency-hopping system used to protect UHF radio traffic]), and is compatible with all tactical VHF/UHF radios.



Figure 3-4 — AN/PRC-117F Manpack radio.

3.1.4.1 AN/PRC-117F Characteristics and Capabilities

The AN/PRC-117F is designed to act as the transmission means for a range of command, control, and communications input devices (both digital data and analog).

The AN/PRC-117F has the following characteristics and capabilities:

- Frequency range of 30–512 MHz – This frequency range covers the frequency bands and modulation modes commonly used by the U.S. Army, U.S. Air Force, U.S. Navy (USN) and Coast Guard for operations, Air Traffic Control (ATC),

tactical data links, and maritime uses. This makes the radio ideal for use as a "liaison radio" or "gateway" between service components using different waveforms for joint ground sea and air operations. Also, AN/PRC-117F's frequency range and waveform modes are compatible with civil and public service frequency bands commonly used by non-DOD local, state, federal, and foreign agencies.

- Modulation – As delivered, the radio is programmed at the factory for compatibility with current "standard" modulation characteristics segmented in the traditional Radio Frequency (RF) bands.
- VHF low band, 30 to 90 MHz
- VHF high band, 90 to 225 MHz FM, AM, frequency band – The radio can be used for air-to-air, air-to-ground and ground-to-ground voice and data communications using waveforms found in this band. The AN/PRC-117F is compatible with a variety of existing military aircraft and air-traffic-control radio communications, as well as military air-to-ground data-link communications, the commercial U.S. Marine Corps (USMC) band, USN/Coast Guard communications and civil police, fire and emergency-management standard radios. Due to its capability, joint and civil-military liaison for both voice and data can be accomplished in one radio by units that have AN/PRC-117F.
- UHF band, 225 to 512 MHz – AM, FSK, amplitude shift-keying. In this frequency band, AN/PRC-117F can be used to perform air-to-air, air-to-ground, ground-to-ground, fixed, or mobile radio communications missions for both voice and data modes.
- UHF SATCOM, 243 to 270 MHz and 292 to 318 MHz – In this frequency range, AN/PRC-117F is fully compatible with SC and Demand Assigned Multiple Access (DAMA) Tactical Satellite (TACSAT) systems.

The AN/PRC-117F operates in the following LOS fixed frequency Cipher Text (CT) operating capabilities and limitations:

- VINSON – 16 kbps data rate, 25 kHz COMSEC (KY-57/58) mode for secure voice and data
- KG-84 compatible – (data only) supports voice only using a 12 kbps data rate in FM and trellis code modulation from 30 to 512 MHz and AM mode from 90 to 512 MHz. Also available in all modes of UHF SATCOM.
- TEKs – electronically loaded 128 bit transmission encryption keys used to secure voice and data communications.
- COMSEC fill – TEKs, TSKs, and KEKs can be filled from the following devices.
    - AN/PYQ-10, SKL

The AN/PRC-117F can operate in HAVEQUICK I/II, utilizing FH from 225–400 MHz, providing compatibility with current airborne FH. It can also operate in SINCGARS FH mode from 30 to 88 MHz, and supports SINCGARS SIP/ESIP features by being placed in either a net master or a net member mode.

The AN/PRC-117F can scan up to 10 LOS fixed frequency or dedicated SATCOM radio voice operation nets. It does not scan HAVEQUICK, SINCGARS, or UHF DAMA nets and digital squelch cannot be used. Scanning combinations of CT and PT nets is allowed by the PT override feature of the VINSON and FASCINATOR CT mode.

3.1.4.2 AN/PRC-117F Data Capabilities

The AN/PRC-117F can be used as a digital data-transmission device. The AN/PRC-117F can send data transmission rates of 56 kbps through SATCOM and 64 kbps ground-to-ground LOS.

3.1.5 AN/PRC-152 Radio

The AN/PRC-152 multiband handheld radio *(Figure 3-5)* is a tactical transceiver designed for use by military and agency personnel requiring Type-I National Security Agency (NSA)-certified secure voice and data communications, which provides highly reliable communications for the severe conditions of tactical operations. The AN/PRC-152 provides multiband, multimode operation. This enables a wide variety of applications for the user, including ground-to-ground, ground-to-air and Tactical Satellite (TACSAT) communications.



Figure 3-5 — AN/PRC-152 radio.

3.1.5.1 AN/PRC-152 Radio Characteristics

The AN/PRC-152 frequency range is continuous from 30 MHz to 512 MHz. The AN/PRC-152 has the following features:

- Up to 99 programmable system presets (numbered 01 - 99) containing user-specified frequencies and operating parameters
- Built-In Test (BIT) for operational test, battery check, display firmware and hardware versions
- Interface to Defense Advanced GPS Receiver (DAGR) GPS device
- Internal Hold-Up Battery (HUB) to maintain programmed information when the AN/PRC-152 main battery is removed
- VINSON, Advanced Narrowband Digital Voice Terminal (ANDVT), Advanced Encryption Standard (AES), FASCINATOR, and KG-84C embedded encryption modes
- Automatic scan operation of both Ciphertext and Plaintext channels on LOS fixed frequency or dedicated UHF SATCOM channels
- Exclusion band that prevents operations on specified frequencies
- Operable on all VHF maritime channel frequencies
- PT Override function, which allows the operator to hear PT voice in CT mode

- Voice Priority Over Data (VPOD), which allows the operator to stop a data transmission and immediately switch to voice simply by keying the radio
- Operable with Falcon III Vehicular Amplifier Adapter (VAA)

3.1.5.2 AN/PRC-152 Capabilities

The following VULOS fixed frequency operating capabilities are supported by the AN/PRC-152:

- Operating Frequency range of 30 MHz to 512 MHz
- Simplex Operation – LOS nets with the same transmit and receive frequencies
- Half-Duplex Operation – LOS nets with different transmit and receive frequencies

The following COMSEC capabilities are supported in the AN/PRC-152 LOS when using fixed frequency CT mode:

- ANDVT – Used for dedicated SATCOM operation, UHF, and HB VULOS operation
- VINSON – 16 kbps data rate, 25 kHz Wideband COMSEC (KY-57/58) mode for secure voice and data
- KG-84C – (Data only) Supports secure data transmission in FM mode and AM mode; also available for UHF SATCOM and HPW operation
- AES –Used for VVLOS operation; support for Cipher Feedback (CFB) and Counter (CTR) crypto modes, unclassified keys only
- VINSON PT Override – Alerts an operator that a receiving transmission from an AN/PRC-152 in PT mode is being received
- TEKs – Electronically loaded 128-bit Traffic Encryption Keys used to secure voice and data communications
- COMSEC Fill – Traffic Encryption Keys (TEK) and Key Encryption Keys (KEKs) can be filled from various devices

The AN/PRC-152 can scan up to 10 LOS fixed frequency or dedicated SATCOM radio voice operation nets and can operate in SINCGARS Frequency Hopping mode and Single Channel mode from 30 MHz to 88 MHz. SINCGARS operates in VINSON COMSEC mode using a TEK. An AN/CYZ-10 Data Transfer Device or AN/PYQ-10 Simple Key Loader Fill Device is required to load SINCGARS FH data to the radio.

3.1.6 Radio Set Control Group AN/GRA-39

Radio Set Control Group AN/GRA-39 (*Figure 3-6*) provides the capability of remotely controlling a radio set up to a distance of 2 miles, using standard field wire. Remote control allows the ability to operate the radio set at the desired installation, yet locate the radio set in the best position for more efficient communication between the remote and the local control unit operators. It also provides a buzzer system so the operators may alert one another. The major components of the AN/GRA-39 are the local control unit and the remote control unit. The sub-components are listed below.

1. BAG CW-598 – Used for storage and transportation of the AN/GRA-39
2. Sling, carrying bag, and case – Used for transportation of the bag
3. Auxiliary sling – Used for carrying either the remote or the local receiver/exciter unit separately
4. Control Group C-2328 – Used to transmit or receive over the remote radio set

5. Control Group C-2329 – Connects to the radio being remoted; connects on the radio audio connector
6. Handset H-189/PT – Allows an operator to receive and transmit voice communications through a radio



Figure 3-6 — AN/GRA-39.

3.1.6.1 Remote Control Unit

The remote control unit (*Figure 3-7*) allows the operator at the remote site to transmit or receive through a radio set from a distance of up to 2 miles. The power supply (six BA-30s) for the remote control unit has a life expectancy of 24 hours.

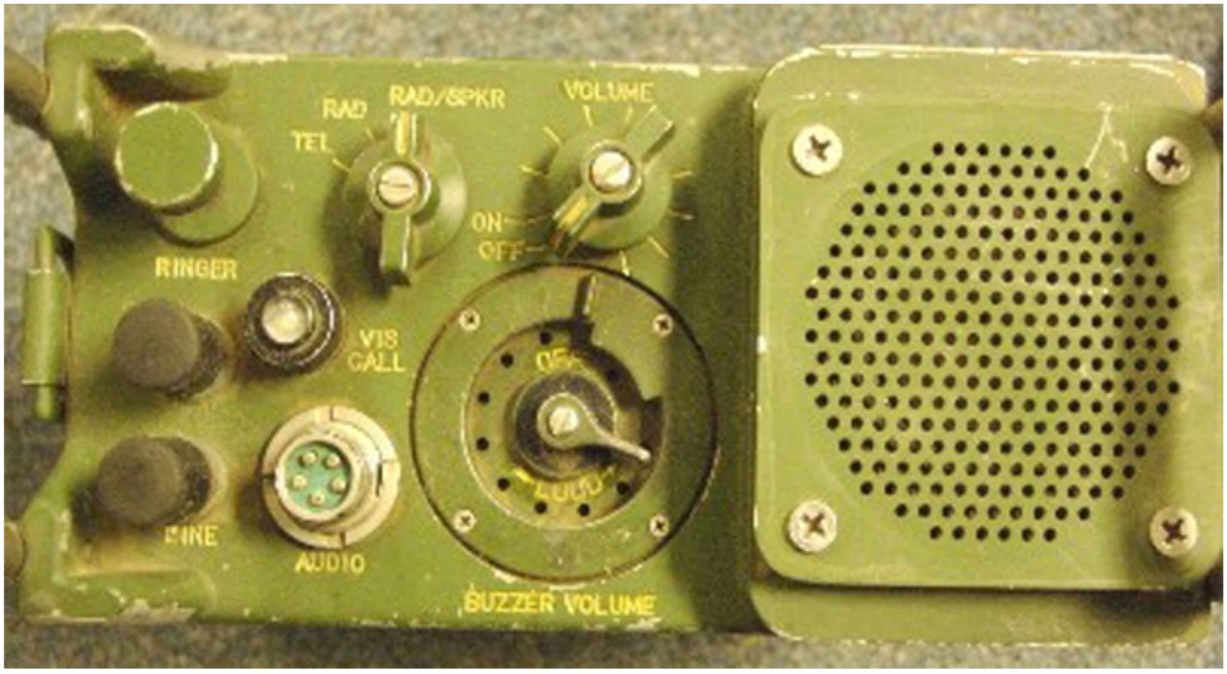


Figure 3-7 — Remote control unit C-2328/GRA-39.

3.1.6.2 Local Control Unit

The local control unit (*Figure 3-8*) is of the same general construction as the remote control unit. The local control unit is connected to the remote control unit by field wire. The local control unit is connected to the radio set being remote with the audio connector. The power supply, composed of six BA-30s for the local control unit, has a life expectancy of 72 hours.



Figure 3-8 — Local control unit C-2329/GRA-39.

3.1.7 AN/PYQ-10 Simple Key Loader

The AN/PYQ-10, Simple Key Loader (SKL) (*Figure 3-9*), was designed as a replacement for the AN/CYZ-10, ANCD. A limited understanding of the Electronic Key Management System (EKMS) operating environment is helpful in understanding the operation of the SKL. The components of the EKMS include:

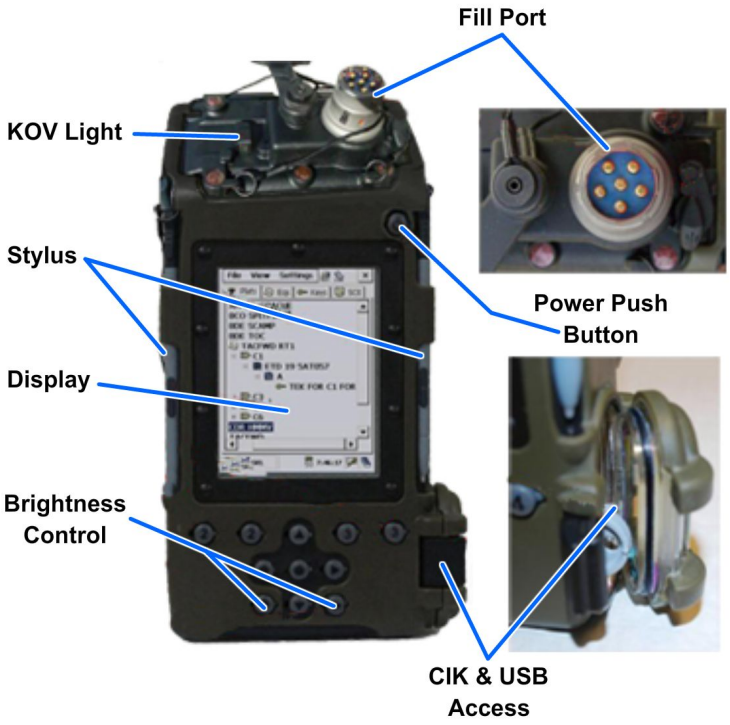


Figure 3-9 — AN/PYQ-10 Simple Key Loader.

- EKMS Tier 0 – The National Security Agency (NSA) central facility provides for production, management, and distribution of specialized electronic cryptographic key and associated materials.
- EKMS Tier 1 – Facilities serve as focal points for the production, management, and distribution of service-unique electronic cryptographic key and materials. Tier 1 facilities also provide an interface between the central facility and service EKMS Tier 2 elements, and facilitate interoperability for joint operations at the theater and strategic levels.
- EKMS Tier 2 – Tier 2 or Local Communications Security Management Software (LCMS) workstations perform generation, management, and distribution of electronic keying material. The LCMS workstation works in conjunction with the SKL to distribute electronic keying material to those networks with electronically keyed COMSEC equipment.
- Automated Communications Engineering Software (ACES) workstations – The ACES workstation integrates cryptonet planning, Electronic Protection (EP) distribution, and SOI generation, management, and distribution. The ACES workstation works in conjunction with the SKL to automate cryptonet control operations for networks with electronically keyed COMSEC equipment.
- EKMS Tier 3 – Tier 3 or the SKL device integrates the functions of COMSEC key management, control, distribution, EP management, SOI management, benign fill, and other specialized capabilities into one comprehensive mobile system. The SKL will interface with the ACES and LCMS workstations to receive its database information and then interface with end cryptographic units to upload the required keying material and information to those units.

The hardware platform that hosts the SKL software (including the Secure Library) is a vendor-supplied, ruggedized, personal digital assistant device equipped with a KOV-21 Personal Computer Memory Card International Association card. The SKL is not equipped with a hard drive so all programs are stored in non-volatile flash memory.

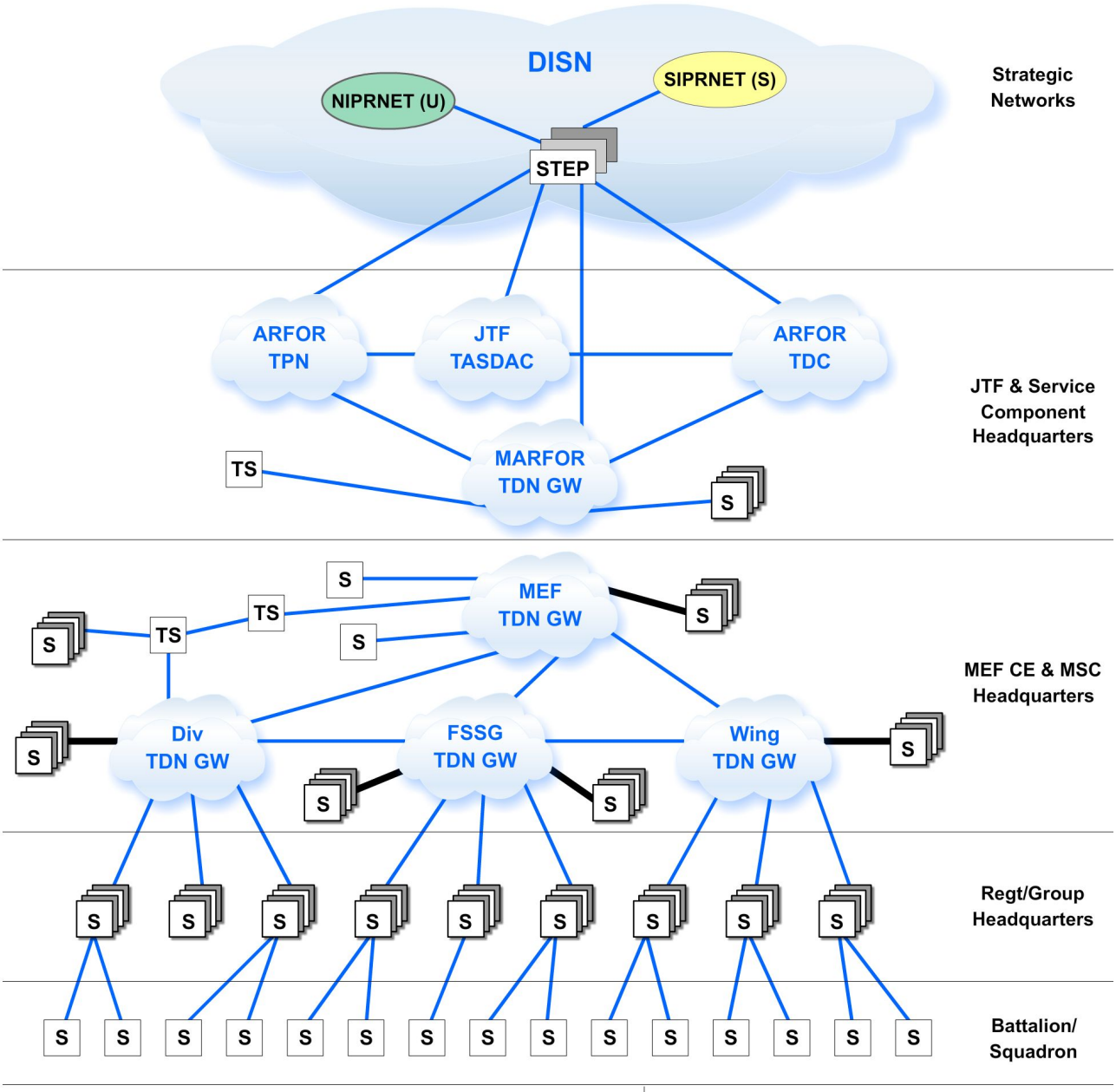
The KOV-21 provides Type I encryption/decryption services and provides the secure interface between the host computer and interfacing devices. The SKL uses an embedded KOV-21 approach. As such, the NSA requires that a Cryptographic Ignition Key (CIK) be used to lock and unlock the KOV-21 information security card.

The CIK is a separate, removable, non-volatile memory device designed to protect internal SKL keys and data from physical compromise when the SKL is in an unattended, non-secured environment. When the CIK is removed from the SKL, the KOV-21 card cannot be unlocked. Therefore, access to the data is denied. The absence of the CIK prevents the use of SKL operations.

3.1.8 Tactical Data Network (TDN)

The TDN (*Figure 3-10*) is a system of data communications gateways and servers interconnected with one another and their subscribers via a combination of common user long-haul transmission systems organic to the Marine Corps and Navy operating forces, local area networks, single channel radios, multi-channel communications, and the switched telephone system. This network provides subscribers with basic data transfer and packet services; and access to strategic, supporting establishment, joint, and other service component TDNs. The TDN will provide user authentication, network management capabilities, and value-added services such as message handling, directory services, file sharing, print services, and terminal emulation support. In addition, the TDN system provides tactical users the infrastructure to support the transition from automatic digital network (AUTODIN) to the mandated replacement system, the defense message system (DMS).

System Architecture for the TDN Gateway and TDN Server



DISN - Defense Information Systems Network

NIPRNET - Unclassified Internet Protocol Router Network

SSIPRNET - Secret Internet Protocol Router Network

STEP- Standardized Tactical Entry Point

TASDAC - Tactical Secure Data Communications

TDC - Theater Deployable Communications

TPN - Tactical Packet Network

LEGEND

GW — TDN LAN Gateway

S — TDN LAN Server

TS — TDN TS LAN Server

Serial Circuit

Ethernet

Figure 3-10 — Tactical data network.

The TDN provides a common user path for IP traffic within NCF commands and various military branches. The use of TDN allows a robust data network, unclassified, and TOP SECRET, to replace a number of existing Tactical Data Systems' (TDS) point-to-point circuits. The TDN system will receive incoming and outgoing files and messages from the Local Area Networks (LANs) and Wide Area Networks (WANs), and decide how to route this information to intended recipients. Through the use of smart switching, and on demand routing, the TDN provides economy of the existing communications bandwidth available to the tactical commanders. The TDN server supports up to 48 users.

The TDN gateway and TDN servers serve as the primary data switching system for IP traffic within the Marine Air Ground Task Force (MAGTF) and will interconnect all end-user tactical data system and LANs into a seamless tactical internet. The TDN servers and gateways provide the capability to share files, perform electronic message handling, and achieve transparent routing of digital messages among LANs, the circuit switched network, and multichannel and single channel radio networks. In general, the TDN Servers provide the capability to interconnect the users to the WANs. The TDN gateway can be viewed as a WANs that provides the infrastructure for the TDN servers. The TDN gateway and TDN servers will also internetwork deployed MAGTFs with in-theater joint information systems, strategic level defense networks, and depending on the data network or information domain, the Global Internet. TDN Gateways can connect with other gateways and TDN servers, which will form the communications backbone for the MAGTF.

TDN gateways are deployed at the Marine Expeditionary Force (MEF) and Major Support Command (MSC) levels. The mission of the TDN gateway is to provide the WAN infrastructure and serve as the connection point between SECRET and unclassified USMC internal data networks and the global SECRET Internet Protocol Router Network (SIPRNET) and sensitive but Unclassified Internet Protocol Router Network (NIPRNET).

The TDN server will be deployed at the MEF, MSCs, and units down to the command and squadron level. It will provide access to the other TDN servers, the TDN gateway, and will act as a gateway to other Service networks, when required. The TDN server can reliably handle information of all classification levels, from unclassified to TOP SECRET, depending on which network the Data Distribution System (DDS) is connected to.

3.1.9 Blue Force Tracker

The Blue Force Tracking (BFT) system is a SATCOM tracking and communication system that provides the commander eyes on the friendly forces and the ability to send and receive text messages. BFT maintains Situational Awareness (SA) of location and movement of friendly forces, sometimes termed "Blue Force," assets. BFT provides the Seabee with a globally responsive and tailorable capability to identify and track friendly forces in assigned areas of operations (in near real time), thereby augmenting and enhancing Command and Control (C2) at key levels of command.

The BFT contains computer hardware and software, interconnecting cables, L-band satellite transceiver, a mission data loader to transfer larger files, and an installation kit appropriate to the host vehicle type (if applicable).

The BFT computer console tracks friendly units carrying portable miniature transmitter devices. The transmitter devices are GPS-enabled, and send a signal via satellite detailing an individual or unit's location. Seabees can program the transmitter devices to send location updates every five seconds. The transmitter devices are small enough to

be carried in a Modular Lightweight Load-carrying Equipment (MOLLE) pack. Friendly forces appear as blue squares on the system's operator computer display. Units also have the capability to input enemy coordinate positions and obstacles on patrol routes. Enemy units appear as red squares, and obstacles as green squares. If units on the ground run into an enemy position, they can send that information to the system, and everyone who is connected on that network will be able to see the new data. The tracking system gives detailed information on friendly and enemy units up to a range of 5,000 miles. As long as the systems are connected through the satellite network, commanders can see the activities of their brigade and below-sized units.

The BFT supports a wide variety of joint missions and operations. BFT generates and distributes a common view of the operational environment at the tactical and operational levels, identifying and sharing that view with ground vehicles, rotary-wing aircraft, and joint command centers.

3.2.0 Antennas

3.2.1 OE-254 VHF Field Antenna

The OE-254 (*Figure 3-11*) is a broadband, omnidirectional, biconical antenna. The OE-254 does not require tuning for specific bands and can cover the 30 to 87.975 MHz VHF band without adjustments. The antenna has a 350-watt continuous delivery rate. The feed point impedance is fairly constant across the band at about 160 ohms. To provide a low standing-wave ratio and match a 50-ohm transmission line and radio, the antenna incorporates a 4:1 balun with a small capacitor across the low-impedance (feed line) side. The center section includes a balanced to unbalanced transformer (balun) and simple matching network. This antenna provides a low Standing-Wave Ratio (SWR), omnidirectional pattern, and low angle of radiation over the entire 30–88 MHz band.



Figure 3-11 — OE-254 VHF Field Antenna.

Three upward and three downward radial elements—each eight feet long arranged 30 degrees from the vertical and 120 degrees apart—simulate two cones, which provide omnidirectional VHF Line of Sight (LOS) radiation. The antenna is usually mounted on a 33-foot 8-inch mast for an overall height of 41 feet 9 inches. The antenna may be installed at lower heights; however, care should be taken to ensure that the lower and upper mast adapter assemblies are always used. An 80-foot coaxial cable comes with the antenna for direct connection to a radio.

3.2.2 AS-2259/GR HF Antenna

The AS-2259/GR HF antenna (*Figure 3-12*) provides Near-Vertical Incidence Skywave (NVIS) propagation for short-range radio circuits. It consists of two crossed sloping dipoles positioned at right angles to each other and is supported at the center by a 15-foot mast. In use, the dipole's components provide guying support for the mast. Characteristics for the AS-2259 are listed in *Table 3-1* below.

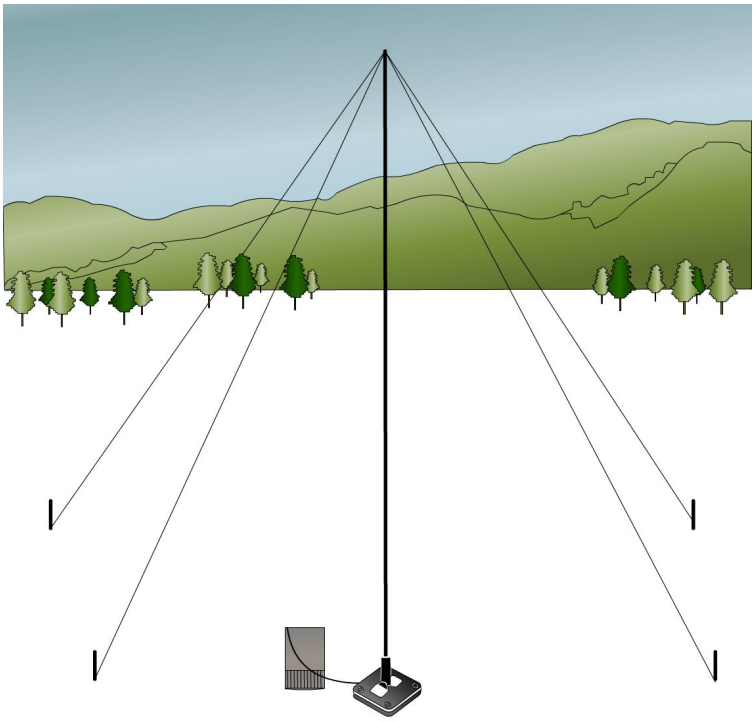


Figure 3-12 — AS-2259/GR HF Antenna.

Table 3-1 — AS-2259 HF Antenna Characteristics

Frequency range:	2 to 30 MHz
Polarization:	Horizontal and vertical simultaneously
Power capability:	1,000 watts
Radiation pattern Azimuthal (bearing):	Omnidirectional

3.2.3 TR-72 Dipole Half-Wave Antenna

The horizontal half-wave dipole (doublet) antenna is used on short- and medium-length sky wave paths (up to approximately 1,200 miles). Since it is relatively easy to design and construct, the doublet is the most commonly used field expedient wire antenna. It is a very versatile antenna; by adjusting the antenna's height above ground, the maximum gain can vary from medium take-off angles (for medium path-length circuits) to high take-off angles (for short path-length circuits). When the antenna is constructed for medium takeoff angle gain (a height of approximately one-half wavelength), the doublet is a bidirectional antenna (i.e., the maximum gain is at right angles to the wire). This is the broadside pattern normally associated with a half-wave dipole antenna. *Figure 3-13, frame 1*, shows this pattern in polar plot format.

Figure 3-13, frame 2, shows the radiation off the ends of the wire. It is easily seen by comparing with *frame 1* that for maximum gain, a doublet one-half wavelength above ground should be constructed so that the side of the antenna points in the direction of the distant station. If the antenna is lowered to only one-quarter wavelength above

ground, the effect shown in *Figure 3-13, frame 3*, results. This lower antenna height produces maximum gain at high takeoff angles. In *Figure 3-13, frame 4*, the radiation off the ends of the doublet also has maximum gain at high takeoff angles. This means that for short path-length circuits, which require high takeoff angles, a doublet antenna one-quarter wavelength above ground produces almost omnidirectional coverage.

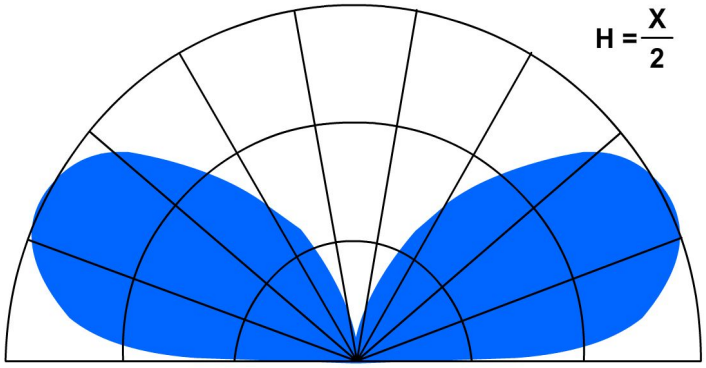


Figure 3-13 — Dipole half-wave antenna.

The vertical plots included for half-wave dipole antennas (*Figure 3-13, frame 5*) are given for heights from 8 to 12 meters. The plot for 8 meters shows that for 3 and 9 MHz the antenna has high-angle radiation. At those frequencies, the antenna is close to ground (compared to a half-wavelength). The pattern for 18 MHz shows the characteristic bidirectional pattern since 8 meters is a half-wave at 18 MHz. The half-wave dipole is a balanced resonant antenna. It produces its maximum gain for a very narrow range of frequencies, normally 2 percent above or below the design frequency. Since frequency assignments are usually several MHz apart, it is necessary to construct a separate dipole for each frequency assigned. If space and other resources are unavailable to erect separate dipoles, three or four dipoles can be combined to occupy the space normally required for one.

Characteristics of the TR-72 are listed in *Table 3-2*.

Table 3-2 — TR-72 Dipole Half-Wave Antenna

Frequency range:	± 2% of design frequency
Polarization:	Horizontal
Power capability:	1,000 watts
Radiation Pattern Azimuthal (bearing):	Bidirectional X/2 high basically omnidirectional at X/4 high

Interaction Available

3.2.4 AT-1011 HF Antenna

The AT-1011 HF antenna (*Figure 3-14*) is suited for a variety of mountings, antenna heights, and configurations. The antenna is made of 4-foot fiberglass sections and comes in eight sections. It can be used as a 12 to 16-foot mobile antenna, or as a 20 to 32-foot transportable stationary system. The sections are put together by hand and do not require tools to tighten. The spring mount permits the top three sections to be used as a 12-foot mobile whip. The upper four sections are tapered to form a 16-foot mobile antenna system. Simply by adding the four extensions, the antenna can be used for stationary use.

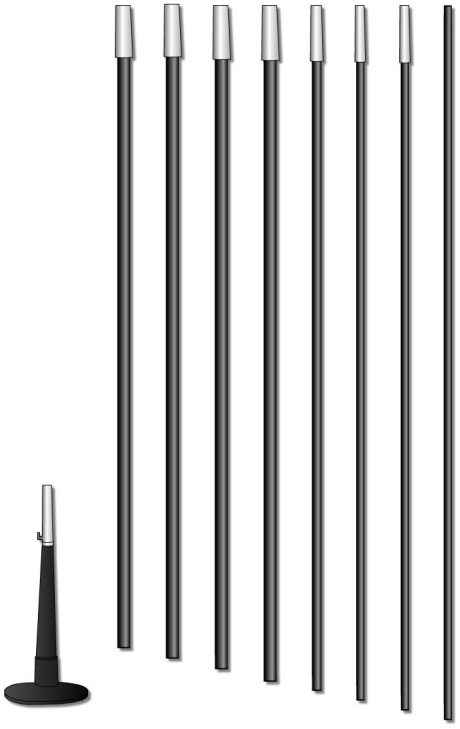


Figure 3-14 — AT-1011 HF antenna.

3.2.5 Satellite Communication (SATCOM) Antenna

The AV-2040 is a foldable, manpack, high-gain, UHF SATCOM antenna (*Figure 3-15*) designed for special missions where portability and high gain are required. The specifications for the AV-2040 are as follows in *Table 3-3*:

Table 3-3 — SATCOM Antenna

Frequency	240-400 MHz
VSWR	1.5:1
Polarization	Right hand, circular
Gain	AV-2040-3: +7.0 dBic, 240-400 MHz AV-2040-2 +11.0 dBic, 240-318 MHz AV-2040-1 +9.0 dBic, 240-400 MHz
Power Handling	200 Watts CW
Axial Ratio	3 dB
Weight	6.5 lbs
Connector Type	BNC Male
Finish	Black
Military P/N	AV-2040-3



Figure 3-15 — SATCOM antenna.

3.3.0 Telephones

3.3.1 TA-312/PT Telephone

The TA-312/PT telephone set shown in *Figure 3-16* is a lightweight, waterproof, battery-powered, field telephone designed for local-battery or Common-Battery (CB) circuits. It has facilities for operating push-to-talk radio circuits and a range of 14 to 22 miles. The set weighs about 9 ½ pounds.

The TA-312/PT consists of three primary components:

1. The telephone set case, made of reinforced canvas
2. The panel and housing assembly that encloses all electrical components
3. A transmitter, a receiver with a push-to-talk switch, and a retractable cord

The power supply for the transmitter consists of two dry cell (BA-30) batteries connected in series furnishing 3 volts for Local Battery (LB) operation. The batteries are used on both local-battery and Common-Battery Signaling (CBS) circuits. One battery is installed in the battery compartment with the positive end up; the other battery is installed with the positive end down. After the batteries are installed, the battery compartment cover should be closed and the cover latch fastened. An external, 3-volt battery source may be used in place of the two BA-30s. The back of the external batteries should be connected to the BAT binding posts on the panel. No batteries are required for CB operation.

In order to operate the TA-312 with the handset, the instructions listed below should be followed.

1. Put the EXT-INT SWITCH in the INT position.
2. To place a call in LB operation, leave the handset in the retaining brackets and turn the generator hand crank. Remove the handset from the brackets and listen for the party you are calling to answer.
3. To place a call in CB operation, remove the handset from the retaining brackets and listen for the operator to answer.
4. To talk and listen in CBS operation, push in on the press-to-talk switch when you talk and release it when you listen.
5. To talk and listen in CB operation, you do not operate the press-to-talk switch.
6. To adjust the buzzer volume, request a distant party to signal; then place the handset in the brackets. When a signal is received, rotate the buzzer control for desired volume.
7. To complete the call, place the handset in the retaining brackets. When the set is connected through an LB switchboard, ring off by turning the hand crank.

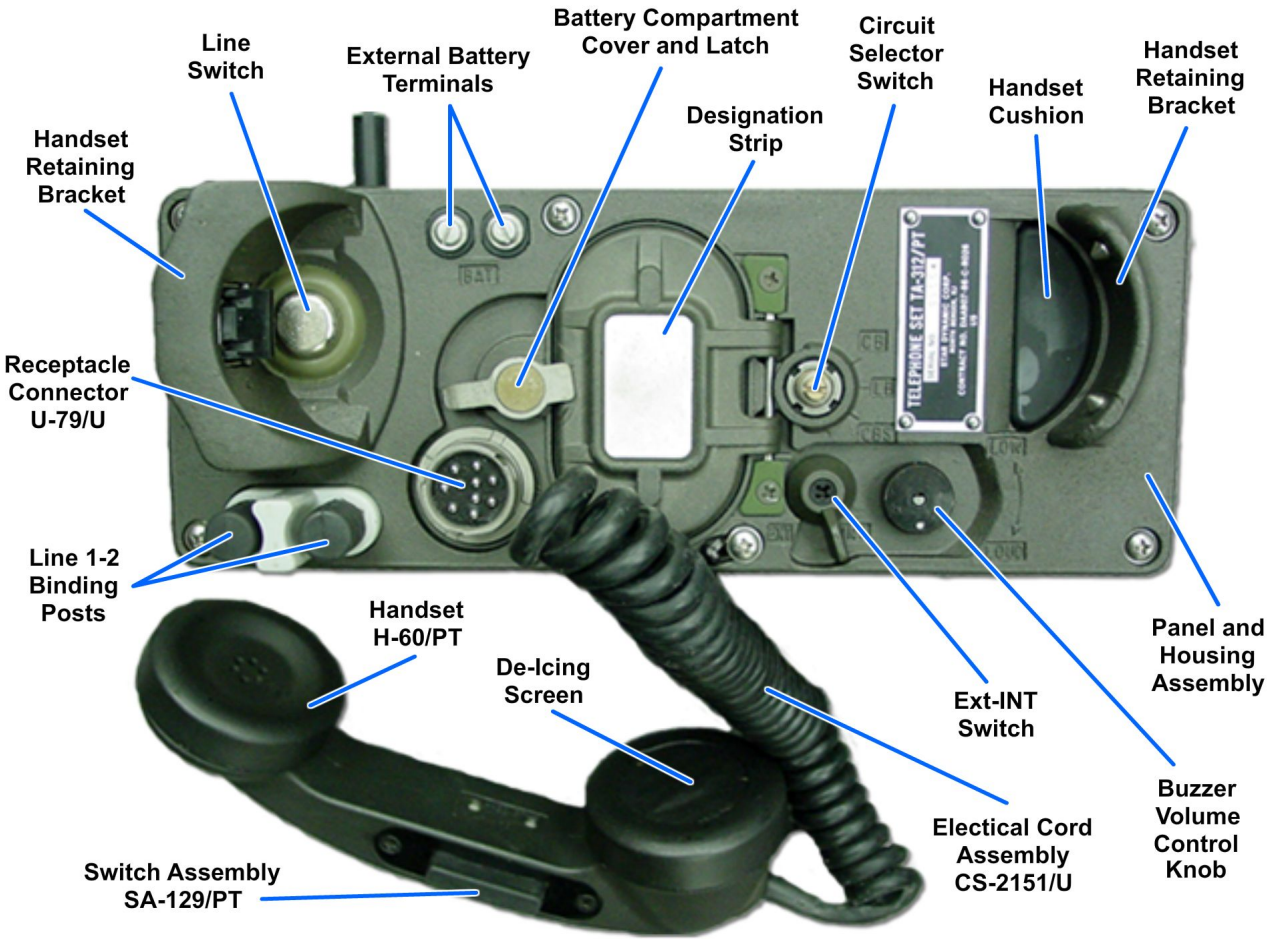


Figure 3-16 — TA-312/PT telephone.

3.3.2 TA-838A Telephone

The TA-838A telephone set (*Figure 3-17*) is a ruggedized, solid-state field telephone. The set can be utilized as a desk- or vertical-mounted telephone and telephone extension in fixed and mobile military shelters or command posts, and in point-to-point tactical field operations. The TA-838A has seven operational modes, with LB or CB service power. It weighs 6 ½ pounds and is 6" high by 10" deep by 6"wide. It can also be used as a subscriber telephone, interfacing with two-or four-wire manual or automatic switchboards and automatic telephone central offices. The TA-838A uses an integral 16-button dual-tone-multi-frequency (DTMF) signaling keypad. It meets MIL-STD-461A and MIL-T-49110 (EL). Versions with 20 and 50 Hz ringing frequencies are available.

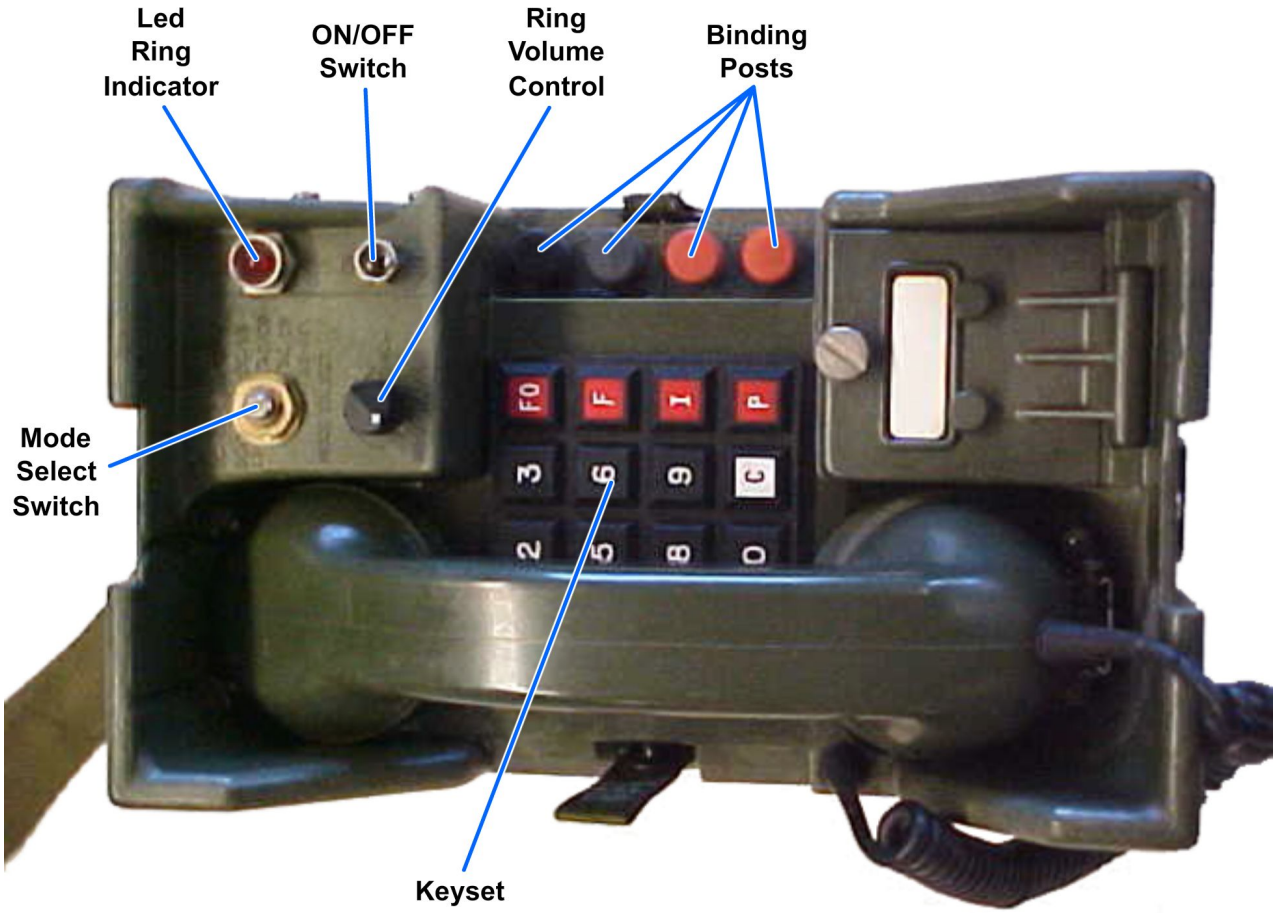


Figure 3-17 — TA-838A telephone.

The set operates on a transmission frequency range of 300 to 3,500 Hz. The telephone set is located less than four miles from the switchboard with DC supervision. When on alternating current (AC) supervision, it can be located more than four miles from the switchboard. The operating temperatures range from 30°F to +150°F. It may be stored in temperatures that range from 70°F to + 160°F. Battery power required to operate in arctic conditions is received from four BA-3042/U, and to operate in regular conditions it only requires BA-42 or Type C flashlight cell batteries.

3.3.3 SB-22/PT Telephone Switchboard

The SB-22/PT telephone switchboard shown in *Figure 3-18* is a lightweight, battery-operated, field switchboard that has 12 interconnecting voice frequency circuits. The SB-22/PT is normally used to interconnect LB telephone circuits and remote-controlled radio circuits. Four BA-30 flashlight batteries provide 3 volts of direct current for its operation. The SB-22/PT has a range of 14 to 22 miles. The switchboard unit weighs about 30 pounds.



Figure 3-18 — SB-22/PT telephone switchboard.

The SB-22/PT consists of four basic parts—the operator's pack (*Figure 3-19, frame 1*), the line and trunk pack (*Figure 3-19, frame 2*), the accessory kits, and the handset-headset (*Figure 3-19, frame 3*).

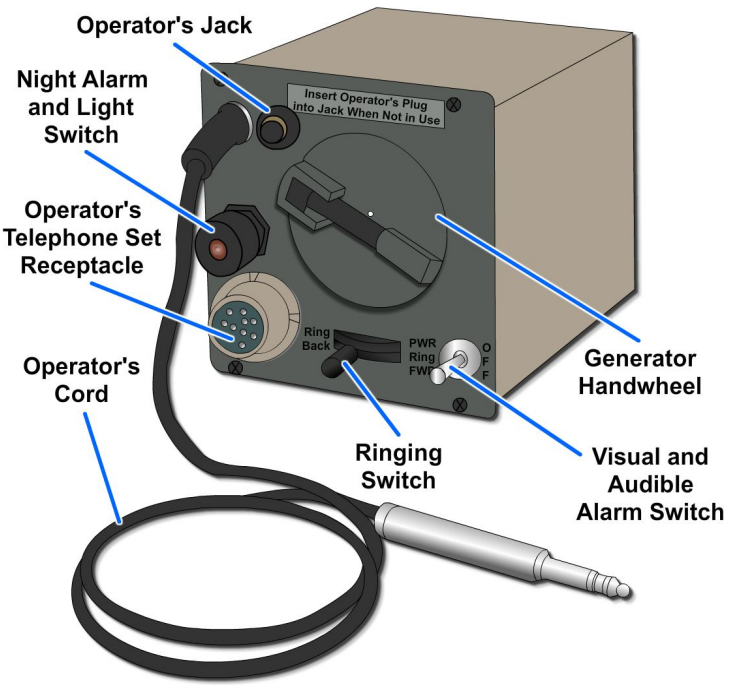


Figure 3-19 —Operator's pack, trunk pack, and the handset-headset.

Before operating the SB-22/PT switchboard, the operator should first become familiar with the different controls and their functions. *Table 3-4* lists the controls and their functions in operating the OPERATOR'S PACK; *Table 3-5* lists the controls and their functions in operating the LINE and TRUNK PACKS.

Table 3-4—SB-22/PT Operator's Pack Control and Function

Control	Function
	Switch position
Ringing switch	RING BACK – Connects ringing current to the calling party's line
	PWR RING FWD – Connects ringing current to the called party's line when an external source of ringing current is used
Night alarm and light switch	NA-IN – Permits the lamp to be used as a silent alarm
	LITE-OUT – Lights the lamp to illuminate the switchboard
Visual and audible alarm switch	OFF – Disconnects the alarm circuit
	VIS – Connects the lamp to the alarm circuit
	AUD – Connects a buzzer to the alarm circuit
Operator's cord and plug	Connects the operator's circuit to the line or trunk pack
Operator's jack	Disconnects the operator's telephone set battery when the operator's cord plug is inserted
Generator hand wheel	Provides ringing current when turned
Operator's telephone set receptacle	Permits connection of the operator's telephone set to the operator's pack

Table 3-5—Line and Trunk Packs Control and Function

Jack (one for each line and trunk pack)	Provides access to the line or trunk
Cord plug (one for each line or trunk pack)	Permits interconnection of lines or trunks through the jacks
Signal (one for each line or trunk pack)	Indicates the circuit requires attention when operated to the white position

3.3.4 Stacking the SB-22/PT Switchboard

To serve more than 12 but fewer than 30 lines, stack the 12-line switchboards. Remove the operator's pack from the switchboard and install 5-line packs in the empty space. Place this modified switchboard on top of a normally equipped switchboard. Use two jumpers to connect the two switchboards. One jumper must be connected to the NA binding posts of both switchboards and the other jumper must be connected to the GND binding posts of both switchboards. Be sure that the jumpers pass through the slot at the side of each switchboard. Only one set of batteries is required to serve both switchboards; remove the battery case from the one containing the 17-line packs (from which the operator's pack has been removed). The field telephones can then be connected. A maximum of 29 lines can be served with this arrangement as shown in *Figure 3-20*.



Figure 3-20 — Installation arrangement for two switchboards.

3.4.0 Radio and Telephone Procedures

Even though your primary duties are those of a rifleman or machine gunner, you may be called upon to pick up a radio to pass some valuable information to one of the platoons or to the command headquarters.

The intent of this section is to provide enough knowledge of correct radio and telephone procedures so you can operate the voice radio equipment in a Seabee command.

The following terms are defined to give you a better understanding of the explanations in the following section.

1. TRANSMISSION: This is a communication sent by one station and intended for reception by another station or stations.
2. ANSWER: An answer is a transmission made by a station called in response to the call received.
3. CALL SIGN: A call sign is a word, or a combination of words, intended for transmission by voice means, and it identifies the command, unit, or authority of the radio station.
4. NET CALL SIGN: The collective call sign that represents all the radio stations operating together on a particular radio net is called the net call sign.
5. NET CONTROL STATION: This is the radio station appointed by higher authority to direct and control the operation and flow of all traffic handled on the radio net.
6. PROWORD: This refers to a pronounceable word or phrase that has been assigned a meaning to speed up message handling on radio nets that use radio and telephone. A list of prowords and their meanings is presented later in this section.
7. ABBREVIATED PLAINDRESS MESSAGE: This refers to a message that has certain elements of the message heading omitted for speed of handling. Anyone or all of the following may be omitted: precedence, date, date-time group, and group count.
8. RECEIPT: A receipt is a communication sent by the receiving operator indicating that the message or other transmission has been satisfactorily received.
9. ACKNOWLEDGMENT: An acknowledgment is a separate message originated by the addressee to inform the originator that his message has been received and is understood.

3.5.0 Phonetic Alphabet and Numerals

When necessary to identify a letter of the alphabet, the standard phonetic alphabet should be used. This helps to prevent the receiving operator from copying your words or groups of words incorrectly. Bs, Ps, Ts, and other letters that sound alike can be confusing when heard on radiotelephone nets. Learn the phonetic alphabet and the proper pronunciation as spoken over radio networks as listed in *Table 3-6* below:

Table 3-6—Phonetic Alphabet and Pronunciation

Letter	Phonetic Equivalent	Pronounced
A	ALPHA	AL fah
B	BRAVO	BRAH voh
C	CHARLIE	CHAR lee
D	DELTA	DELL tah
E	ECHO	ECK oh
F	FOXTROT	FOKS trot
G	GOLF	GOLF
H	HOTEL	hoh TELL
I	INDIA	IN dee ah
J	JULIETT	JEW lee ett
K	KILO	KEY loh
L	LIMA	LEE mah
M	MIKE	MIKE
N	NOVEMBER	no VEM ber
O	OSCAR	OSS cah
P	PAPA	pah PAH
Q	QUEBEC	keh BECK
R	ROMEO	ROW me oh
S	SIERRA	see AIR rah
T	TANGO	TANG go
U	UNIFORM	YOU nee form
V	VICTOR	VIK tah
W	WHISKEY	WISS key
X	XRAY	ECKS ray
Y	YANKEE	YANG key
Z	ZULU	ZOO loo

USE OF THE PROWORD “I SPELL.” Difficult words or groups within the text of the message maybe spelled out using the phonetic alphabet and should be started with the proword “I SPELL.”

EXAMPLE: CATENARY **. . . . .** “I SPELL” CHARLIE, ALPHA, TANGO, ECHO, NOVEMBER, ALPHA, ROMEO, YANKEE. . . CATENARY. Where the text is composed of easily pronounced words, they can be spoken.

USE OF PROWORD “FIGURES.” In order to distinguish numerals from words similarly pronounced, you may use the proword “FIGURES” before numbers.

TRANSMITTING NUMERALS. When numerals are transmitted by radiotelephone, the rules for their proper pronunciation are listed in *Table 3-7* as follows.

Table 3-7—Pronunciation for Spoken Numerals

Numeral	Spoken as
0	Zero
1	Wun
2	Too
3	Thuh-ree
4	Fo-wer
5	Fi-yiv
6	Six
7	SEV en
8	Ate
9	NIN er

TRANSMITTING NUMBERS. Numbers are transmitted digit by digit except that exact multiples of hundreds and thousands may be spoken as such; however, there are special cases listed in *Table 3-8* when the normal pronunciation of numerals is as follows.

Table 3-8—Pronunciation of Special Numerals

Number	Spoken as
44	Fo-wer Fo-wer
1478	Wun Fo-wer SEV en Ate
16400	Wun Six Fo-wer Hun-dred

3.6.0 Prowords

The following prowords and their meanings, authorized for general use, are those that are commonly used on the Seabee command radio nets.

ALL AFTER: The portion of the message to which I have reference is all of the message which follows.

ALL BEFORE: The portion of the message to which I have reference is all of the message which precedes.

BREAK: I hereby indicate the separation of the text from other portions of the message.

CORRECTION: An error has been made in this transmission. I will continue with the last word I transmitted correctly.

DISREGARD THIS TRANSMISSION: The transmission is an error. Disregard it. This proword shall not be used to cancel a message that has been completely transmitted and for which receipt or acknowledgement has been received.

DO NOT ANSWER: Stations called are not to answer this radio call, receipt for this message, or otherwise transmit in connection with this transmission. When this proword is used, the transmission shall be ended with the proword OUT.

EXEMPT: The addressee call signs immediately following are exempted from the collective call or net call.

FIGURES: Numerals or numbers are to follow.

FROM: The originator of this message is indicated by the call sign immediately following.

INFO: The addressee(s) immediately following is/are addressed for information.

I SAY AGAIN: I am repeating transmission or portion indicated.

I SPELL: I shall spell the next word phonetically.

MESSAGE FOLLOWS: A message that requires recording is about to follow and message is transmitted immediately after the radio call. (This proword is intended for use when messages are passed on tactical or reporting nets. It is not used on nets intended primarily for conveying messages.)

NUMBER: Station serial number of messages sent. Normally run in sequence for one 24-hour period.

OUT: This is the end of my transmission to you and no answer is required or expected.

OVER: This is the end of my transmission to you and a response is necessary. Go ahead; transmit.

PRECEDENCE PROWORDS: Four precedence designations are used in handling radio messages. These precedence prowords indicate the order in which one message is handled relative to other messages. The originator of the message assigns the precedence of the message. The precedence prowords in order of their importance are as follows:

1. FLASH
2. OPERATIONAL IMMEDIATE
3. PRIORITY
4. ROUTINE

READ BACK: Repeat this entire transmission back to me exactly as you received it.

RELAY: Transmit this message to each of the addressees immediately following.

ROGER: I have received your last transmission satisfactorily.

SAY AGAIN: Repeat all of your last transmission. When followed by identification data means “Repeat portion indicated.”

THIS IS: This transmission is from the station whose call sign immediately follows.

TO: The addressee(s) immediately following is/are to take action on this message.

BREAK: I must pause for a few seconds.

BREAK OUT: I must pause longer than a few seconds.

WILCO: I have received your message, understand it, and will comply. To be used only by the addressee. Since the meaning of ROGER is included in that of WILCO, the two prowords are never used together.

WORD AFTER: The word of the message to which I have reference is that which follows.

WORD BEFORE: The word of the message to which I have reference is that which proceeds.

WORDS TWICE: Communication is difficult. Transmit each phrase (or each code group) twice. This proword may be used as an order, request, or as information.

WRONG: Your last transmission was incorrect. The correct version is _____ .

4.0.0 FIELD MESSAGE FORMAT AND PREPARATION

The field message book, NAVMC 694, is primarily and extensively used in a tactical environment. Each book contains a hundred message forms that are self-carboning for easy duplication. A sample message and instructions for preparing field messages are depicted in *Figure 3-21*. Spaces are provided at the bottom of the form to record the time of receipt (TOR) and time of delivery (TOD). The form is also a convenient reference when records are necessary.

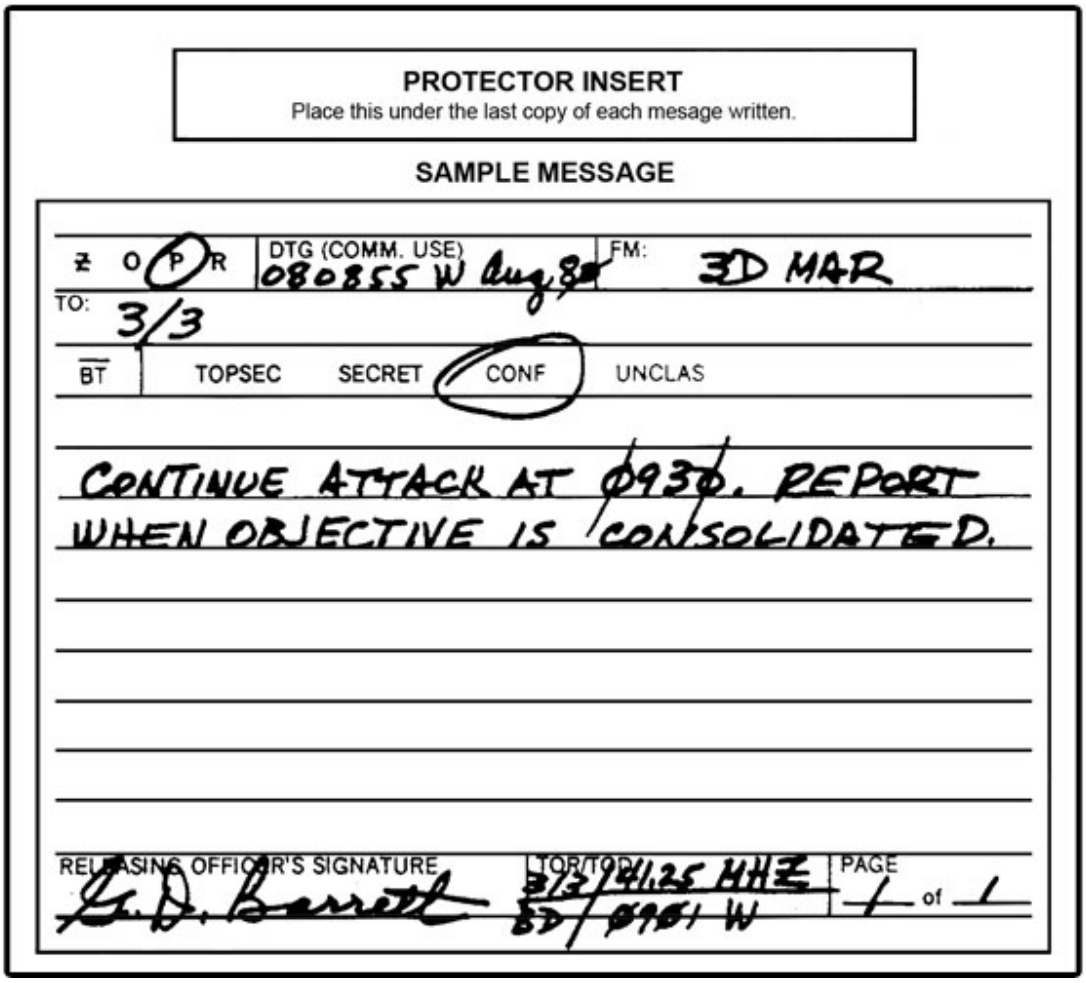


Figure 3-21 — NAVMC 694.

Instructions for preparing the field message card are as follows:

1. Drafter:
    - Place the protector insert under the message blanks to limit the number of copies produced. Retain one copy in the book as a file copy. Classify cover in accordance with contents.
    - Use BLOCK CAPITAL letters for all entries.
    - To assign precedence, circle the appropriate letter using the table on the front cover as a guide.
    - Print organization originating message in “FM” space. (Do NOT use call sign.)
    - Print organization(s) for whom the message is intended in the “TO” space. (Do NOT use call sign.)

- To assign classification, circle the appropriate classification printed on the message blank.
- Do NOT use abbreviations in text. (Abbreviations will lengthen the transmit time.) Be brief. Use simple words. Use "Ø" for all zeros. Number pages in appropriate space.
- Drafter is responsible for all message drafting functions to include the use of brevity codes and numeral/letter encryption.

2. Releasing Officer:
   - Ensure drafter functions are completed.
   - Sign appropriate space if message is approved (first page only).
3. Operator:
   - Assign local-time date-time-group, "DTG" if required by unit standard operating procedure (SOP).
   - Convert "FM" and "TO" entries to call signs (for unsecure voice transmission only).
   - Fill in time of receipt and time of delivery (TOR/TOD) information as appropriate:

$$\text{TOR/TOD} = \frac{\text{Station called/Frequency}}{\text{Operator initials/Time}}$$

4.1.0 Tactical Message Formats

The different types of reports and their content are published in the command's OPORD. On a patrol or in an emergency, you cannot always readily refer to the OPORD. Providing inadequate information (or even worse no information), about tactical situations can be harmful and can prevent a proper response. Always depict who, what, when, where, and how, if known; then, follow it up later as more information becomes available. The rule of thumb for reporting tactical information is to remember the following acronym SALUTE.

S	Size of enemy unit
A	Activity of enemy unit
L	Location of enemy unit
U	Uniform worn by the enemy
T	Time of each activity noted
E	Equipment used or carried by the enemy

4.2.0 Security

An important rule of communication is to remember that the enemy is always listening; therefore, we must always use correct security procedures when communicating classified information. Even seemingly unimportant unclassified information can be a valuable source of intelligence to the enemy. Certain information is prohibited from being transmitted in the clear. This type of information is known as Essential Elements of Friendly Information (EEFI).

4.3.0 Beadwindow Codes

The EEFI system is actually a code that allows us to notify one another of a security breach that has occurred over a circuit. The term used to identify a violation of this type is BEADWINDOW (example: BEADWINDOW THREE). This indicates to the transmitting station that he has violated security. The only response to a BEADWINDOW is ROGER OUT. All violations must be reported. BEADWINDOW procedures are incorporated into the OPORD. They are given in *Table 3-9* below. Others can be added at the discretion of the commander.

Table 3-9—Beadwindow Codes

Position – 01	Friendly or enemy position, movement, or intended movement: position, course, speed, altitude, or destination of any air, sea, or ground element unit or force.
Capabilities – 02	Friendly or enemy capabilities or limitations: force composition or identity, capabilities, limitations, or significant casualties to special equipment, weapon systems, sensors, units, or personnel. Percentages of fuel or ammunition remaining.
Operations – 03	Friendly or enemy operations, intentions, progress, or results: operational or logistic intentions, assault objectives, mission participants, flying programs, mission situation reports, results of friendly or enemy operations.
Electronic Warfare – 04	Friendly or enemy Electronic Warfare Emission Control (EW/EMCON) intentions, progress, or results: intention to employ Electronic Countermeasures (ECM), results of friendly or enemy ECCM, results of Electronic Warfare Support Measures (ESM), present or intended EMCON policy, and equipment affected by EMCON policy.
Personnel – 05	Friendly or enemy key personnel: movement or identity of friendly or enemy flag officers, distinguished visitors, unit commanders, and movements of key maintenance personnel indicating equipment limitations.
COMSEC – 06	Friendly or enemy COMSEC locations: linkage of codes or code words with plain language; compromise of changing frequencies or linkage with line numbers; circuit designator linkage of changing call signs with previous call signs or units; compromise of encrypted or classified call signs; and incorrect authentication procedure.
Wrong Circuit – 07	Inappropriate transmission: information requested, transmitted or about to be transmitted that should not be passed on the circuit because it either requires greater security protection or is not appropriate to the purpose for which the circuit is provided.

4.4.0 Messengers

Messenger service is the backbone of the rifle company communication system and is a backup for both the wire and radio systems. Wire lines may be cut by enemy fire or by enemy infiltration. Radio communication is insecure and should not be relied upon as the only means of communication; therefore, the foot runner is most dependable. The manner in which messengers are used depends on the tactical situation. Normally, a messenger from each rifle platoon is sent to the company command post. Then, with each displacement, he is replaced with a new messenger. This provides the company commander with a runner who knows the exact location of his parent rifle platoon. One company messenger is located in the Combat Operation Center (COC) and is replaced by another upon each company displacement.

4.4.1 Communication by Messenger

When time permits, a message should be written; however, oral messages are often necessary. A complete message must answer the questions of what, when, and where; but a message should be made as brief as possible, omitting words that do not add to the meaning.

A written message should be printed in plain block letters; individual letters contained in the message should be spelled out using the phonetic alphabet (as, Zulu for letter Z). The name of the command authorizing the message and the name of the command to which it is being sent must be written in the message. The actual writer of the message must sign his name and rank or rate.

4.4.2 Messenger Training

A combat messenger must be trained carefully in the following skills:

1. How to deliver messages, either oral or written.
2. How to travel over various kinds of terrain at prescribed speeds.
3. How to use a compass for orientation and direction.
4. How to read maps.
5. How to select routes that provide the best cover and concealment.
6. How to recognize units and command posts with which communication is maintained.

4.4.3 Messenger Briefing

Each messenger must receive a briefing with the following information:

1. The name and location of the post, unit, or person to whom the message is to be delivered
2. The route to be followed
3. The danger points to be avoided
4. The speed required
5. Whether or not an answer is required
6. Where to report in case the message cannot be delivered
7. The contents of the message if the situation warrants
8. Special instructions, if any

For an oral message, the messenger must be required to repeat the message to the sender, to memorize it, and to deliver it word-for-word.

4.5.0 Combat Signals

Oral (that is, voice) communication is often difficult or impossible under combat conditions. At times, complete silence must be maintained. Under such conditions, signals are used to transmit commands or information. Three types of combat signals are used:

1. Whistle signals
2. Special signals

3. Arm and hand signals

Understanding combat signals is important for a fire team. Make sure you become thoroughly familiar with each signal described in this section. Bear in mind, too, that practice in the use of combat signals is essential if the signals are to be used effectively.

4.5.1 Whistle Signals

As a rule, only three whistle signals are used, since a large variety could cause confusion. The following three are commonly used whistle signals:

1. ATTENTION TO ORDERS is indicated by one short blast on the whistle. It is used to fix the attention of unit members on the unit leader who gives the signal and means that other signals, orders, or commands are to follow.
2. CEASE FIRING is indicated by one long blast on the whistle. This signal is verified immediately by an arm and hand signal or by some other means.
3. HOSTILE AIRCRAFT or MECHANIZED VEHICLE is indicated by three long blasts repeated several times.

4.5.2 Special Signals

Special signals cover all the special methods and devices used to transmit commands or information. Rifle shots or automatic rifle bursts maybe used when the entire command knows their meanings and the sound is distinct enough to be heard easily. A squad leader operating at night may find the use of raps on his helmet or rifle effective. Signals must be determined and practiced before they are used. Various pyrotechnic and smoke signals may be chosen as signals to attack, withdraw, mark front lines, or indicate targets.

Certain special signals are standard for all branches of the Armed Forces to indicate the approach or presence of hostile aircraft or mechanized vehicles. They are as follows:

1. Three long blasts of a whistle, vehicular horn, siren, or Klaxon repeated several times.
2. Three equally spaced shots with rifle or pistol.
3. Three short bursts of fire from automatic small arms.

In daylight, an individual giving the signal should point toward the danger; at night, the alarm should be supplemented by voice warning to indicate the direction—for example, ENEMY TANKS APPROACHING BY THE NORTH ROAD or HOSTILE AIRCRAFT APPROACHING FROM THE WEST.

Unit leaders should devise special signals whenever they appear to be useful in a particular situation. Before devising a special signal for the unit, the leaders should make certain that higher authority has not assigned some other meaning to the same signal.

4.5.3 Combat Arm and Hand Signals

Arm and hand signals are used to transmit commands or information when voice communication is difficult or impossible or when silence must be maintained. Leaders should repeat signals to their units whenever necessary to ensure prompt and correct execution of orders. Leaders that are giving arm and hand signals should remember that these are an order of command. The signal is given smartly. Leaders must be aware of their location to ensure the signal can be seen by the intended unit. When a movement is to be executed by a particular unit(s), a signal appointing the unit(s) precedes the signal for the actual movement. If a movement is to be executed in unison, the signal for the movement should be followed by the signal READY. After the READY signal is acknowledged, the movement is executed at the same time that the arm is lowered. Signals requiring a change of direction have no connection with the direction in which the person giving the signal is facing. The direction of movement is shown by the direction in which the arm of the signaler points. Standard arm and hand signals are explained in *Figure 3-22, frames 1 through 28*.

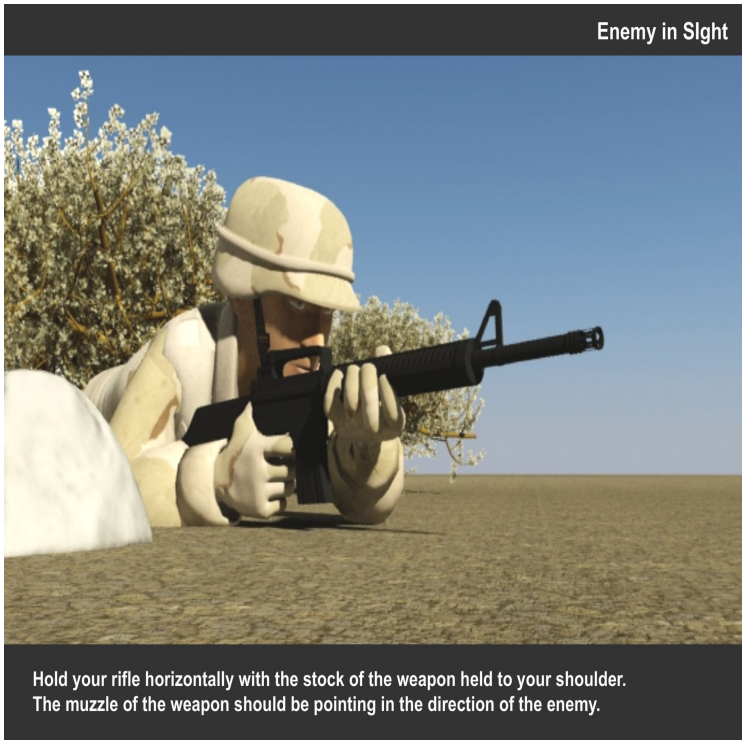


Figure 3-22 — Combat arm and hand signals.

Interaction Available

In modern warfare, a helicopter is a common sight during combat. All personnel should be familiar with hand signals that assist helicopter pilots in landing. Hand signals for guiding a pilot are as follows:

1. To Direct Helicopter Forward – Extend your arms and hands above your head with your palms facing away from the helicopter. Move your hands in a manner that simulates a pulling motion as shown in *Figure 3-23, frame 1*.
2. To Direct Helicopter Backward – Extend your arms and hands above your head with your palms facing toward the helicopter. Move your hands in a manner that simulates a pushing motion as shown in *Figure 3-23, frame 2*.
3. To Direct Helicopter Sideways – Extend your arms and palms out to your side with your palms facing the direction that the helicopter should move. Move your hands in a manner that simulates pushing the helicopter in the desired direction as shown in *Figure 3-23, frame 3*.
4. To Direct Helicopter to Land – Bend your arms at the elbows with your lower arms held parallel to the ground at waist level. Keep palms facing downward parallel to the ground, and forearms moving to simulate a downward pushing motion as shown in *Figure 3-23, frame 4.*
5. To Direct Helicopter to Take Off – Extend both hands above your head with fists clenched and thumbs raised as shown in *Figure 3-23, frame 5*.
6. To Direct Helicopter to Hold Its Present Position – Cross your forearms above your head with both fists clenched as shown in *Figure 3-23, frame 6*.



Figure 3-23 — Helicopter direction arm and hand signals.

Interaction Available

Summary

In this chapter, you were introduced to the different types of radios and equipment attached to the radios the Seabee might use in order to communicate. You also learned how to network the radios to enable communication on the battlefield and the proper use of them. Furthermore, you learned about hand signals in case radio silence must be maintained. It is imperative for you to learn how to set up the radio and operate it proficiently. Communication is the key to battlefield operations; it may save your life.

Assignment 3

Objectives

1. Recognize the fundamentals of tactical combat communications.
2. Identify the radio and telephone sets in general use in the Naval Construction Force, their characteristics, components, and operating procedures.
3. Select the correct definitions of terms pertaining to radio and telephone communicating procedures.
4. Identify principles of communications by messenger and signals.

Questions

1. The most common means of communication is

    1. visual signaling
    2. transmitting electrically
    3. writing
    4. speaking

2. For a company engaged in a static defense, the primary means of communications is by

    1. radio
    2. telephone
    3. flares
    4. horns

3. Under normal circumstances, what unit establishes and maintains lateral communications between two adjacent units?

    1. Larger unit
    2. Unit on the left
    3. Unit on the right
    4. Smaller unit

4. In a Naval Construction Force (NCF) convoy, the primary means of communications is usually by

    1. whistles
    2. flags
    3. smoke
    4. radio

5. Of the communications used by the Seabees, what method is least secure from enemy monitoring?

    1. Visual
    2. Wire
    3. Radio
    4. Courier

6. How many hours of operation will the BB-390BU batteries provide?

    1. 6 to 8
    2. 8 to 10
    3. 12 to 24
    4. 30 to 38

7. Of the steps listed, what is the first step in setting up the AN/PRC-119 radio set for operation?

    1. Inspect the battery box
    2. Plug in the headset
    3. Turn function switch 3 to ON
    4. Set the frequency band switch

8. You may reduce the rushing noise heard on the AN/PRC-119 by turning the function switch to what position?

    1. Lite
    2. Retrans
    3. Squelch On
    4. off

9. What provides the capability of remotely controlling a radio set up to a distance of 2 miles?

    1. AN/GRA-39
    2. AN/PRC-117
    3. AN/PRC-119
    4. AN/PRC-152

10. What radio has an optional internal GPS unit than can be used with time tracking and positioning reporting?

    1. AN/PRC-117
    2. AN/PRC-119
    3. AN/PRC-150
    4. AN/PRC-152

11. The TA-312/PT telephone has a receiving or transmitting range of about how many miles?

    1. 8 to 12
    2. 14 to 22
    3. 28 to 33
    4. 38 to 45

12. On the SB-22/PT telephone switchboard, what switch enables you to use its lamp as a silent alarm?

    1. Ringing
    2. Night alarm and light
    3. Visual and audible alarm
    4. None

13. On the SB-22/PT telephone switchboard, what control provides the means for interconnecting the lines or trunks through the jacks?

    1. Jacks
    2. Signals
    3. Cord plugs
    4. Headset/handset

14. A word or combination of words that identifies a specific radio station is known as its

    1. proword
    2. precedence
    3. net call sign
    4. call sign

15. To expedite traffic, you use a word or phrase that has been assigned a specific meaning for telephone and radio transmission purposes. This is what type of word?

    1. Proword
    2. Precedence
    3. Catenary
    4. Net control

16. Numbers that are part of the text of a message should be preceded by what proword?

    1. Numbers
    2. Numerals
    3. Figures
    4. Digits

17. To identify a radio message that is lowest in order of importance, you should use what precedence proword?

    1. Flash
    2. Deferred
    3. Routine
    4. Priority

18. What is the most secure and dependable means of communications as used by a rifle company?

    1. Radio
    2. Wire
    3. Arm-and-hand signals
    4. Messenger

19. What technique is utilized when writing a message to be sent by messenger?

    1. Pad it with extra words to confuse the enemy
    2. Make it as brief as possible
    3. Provide all the information you have on the topic
    4. Write it in code using current passwords

20. A combat messenger should be able to recognize units and their CPs, use cover and concealment to the messenger's advantage and possess what other skill?

    1. Run very fast
    2. Use maps and a compass
    3. Speak the native language
    4. Know the enemy territory

21. During daylight hours, special signals warn of approaching danger. These signals should be supplemented in what way at night?

    1. With lights that shine in the direction of danger
    2. With shots fired in the direction of danger
    3. With an oral description that includes the direction of danger
    4. With map showing the danger

22. The signal to execute a movement in unison should be followed by what other signal?

    1. ATTENTION
    2. READY
    3. FORWARD
    4. SHIFT

23. To indicate the direction that a column is to move, the signaler, using hand-and-arm signals, takes what action?

    1. Faces that direction
    2. Points with arm
    3. Waves arms in that direction
    4. Whistles and points in the direction

24. The standard operation order format includes a total of how many numbered paragraphs in the body?

    1. Three
    2. Five
    3. Seven
    4. Nine

25. Spoken orders that are recorded verbatim by the receiver are known as

    1. oral
    2. dictated
    3. recorded
    4. relayed

26. The topics of the paragraphs in the body of an operation order may be remembered by what code word?

    1. SMAEC
    2. SMCEA
    3. SMCAE
    4. SMEAC

27. When issued by the squad leader, an operation order contains a total of how many main topics?

    1. One
    2. Two
    3. Three
    4. Five

28. Where in the operation order is a supporting unit usually shown?

    1. In paragraph 1d
    2. In paragraph 1a
    3. Under the headquarters that commands it
    4. Under the headquarters of the major unit supported

29. What is the purpose of the operation order annexes?

    1. To amplify the operation order
    2. To set forth the basic mission
    3. To repeat instructions given in the operation order
    4. To provide step-by-step procedures

30. Boundaries of zones of responsibility, action, or movement are usually designated to what map features?

    1. Political jurisdictional boundaries
    2. Lines of latitude and longitude
    3. Military grid lines
    4. Terrain features

31. In an operation order, geographic names are written in what format?

    1. Lettered in italics
    2. Handwritten in lowercase letters except for the first letter
    3. Written or printed in capital letters
    4. Underlined

32. Areas may be designated by naming a series of limiting points in what manner?

    1. Counterclockwise from the enemy's right front
    2. Clockwise from the enemy's left front
    3. Counterclockwise from the friendly troops right front
    4. Clockwise from the friendly troops left front

ASSIGNMENT 3

Organic Communications Equipment

Directions: Select the correct answer from the list of alternates below each question in the end of chapter assignment. Write in the answer next to the corresponding question number below. Use this answer sheet as a reference to completing the online assignment related to this assignment.

1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	

12.	
13.	
14.	
15.	
16.	
17.	
18.	
19.	
20.	
21.	
22.	

23.	
24.	
25.	
26.	
27.	
28.	
29.	
30.	
31.	
32.	

Additional Resources and References

This chapter is intended to present thorough resources for task training. The following reference works are suggested for further study. This is optional material for continued education rather than for task training.

ACP 121(H), Communication Instructions General, Combined Communication-Electronics Board, April 2007.

ACP 125(F), Allied Communications Publications Communications Instructions Radio Telephone Procedures, September 2001.

TM 3-5810-410-13&P, Technical Manual Operators and Field Maintenance Manual for Transfer Unit, Cryptographic Key AN/PYQ-10(C), Headquarters, Department of the Army, 1 September 2007.

TM 3-5820-890-10-1, Technical Manual Operator's Manual, SINCGARS Ground Combat Net Radio, ICOM, Headquarters, Department of the Army, 1 September 1992.

SL-4-07508A, PCN-124-075080-00, AS-2259/GR Antenna, Department of the Navy, U.S. Marine Corps, Marine Corps Stocklist, March 1994.

CJCSM 6231.03B, Manual for Employing Joint Tactical Communications, Joint Chiefs of Staff, Washington, D.C., 1 August 2002.

COMFISTCDINST 2000.2, 25 FEB 2004, Department of the Navy, Communications Information Systems Policy and Procedures (CISSP).

FM 6-02.53, Tactical Radio Operations, Headquarters, Department of the Army, August 2009.

SL-4-04616, Radio Set Control Group AN/GRA-39, Department of the Navy, U.S. Marine Corps, Marine Corps Stocklist, December 1978.

MCRP 6-22D, Field Antenna Handbook, Department of the Navy, U.S. Marine Corps, 1 June 1999.

TM 3-5985-357-13, Technical Manual Operator's, Organizational, and Direct Support Maintenance Maual for Antenna Group OE-254/GRC, Headquarters, Department of the Army, 1 February 1991.

SL-3-09669C, OCN-123-096692-00, Components list for Radio Set AN/PRC-119F, Department of the Navy, U.S. Marine Corps, February 2000.

SL-3-07867A, PCN-123-078670-00, Components list for Switchboard, Telephone SB-3614(V)/TT, Department of the Navy, U.S. Marine Corps, January 2002.

TM-3-5805-749-12, Operator's and Unit Maintenance Manual for Switchboard, Telephone SB-3614A(V)/TT, Headquarters, Department of the Army, 1 August 1987.

TM-3-5805-650-12, Technical Manual, Operator's Manual and Organizational Maintenance Manual for Telephone Set TA-838/TT and Telephone Set TA-838A/TT, Headquarters, Department of the Army, 25 January 1985.

SL-3-09671B, PCN-123-009673-00, Components list for Radio Set AN/VRC-90D, Department of the Navy, U.S. Marine Corps, April 1997.

Trainee Feedback

Center for Seabees and Facilities Engineering (CSFE) makes every effort to keep their courses up-to-date and free of technical errors. If you have a suggestion, found an error or inaccuracy, please write, FAX or email us by using the form below. Use one form for each comment and be sure to fill in the information as accurately and detailed as possible. Thank you for your assistance.

Write: CSFE
NCF Training Division (N7B)
3502 Goodspeed St.
Port Hueneme, CA 93043-4337

FAX: (805) 982-5508 / DSN 551-5508

E-mail: CSFE_CBCH@navy.mil

Trainee Feedback Form

Course: Seabee Combat Handbook, Volume ____, NAVEDTRA: _____

Course Date: _____ Chapter Number: _____ Page: _____

Paragraph: _____ Sentence: _____ Figure: _____ Frame/View: _____

Description: _____
_____
_____
_____
_____
_____

(optional) Corrective action: _____
_____
_____

(optional) Supporting reference(s): _____
_____

Your email address, if a response is requested: _____

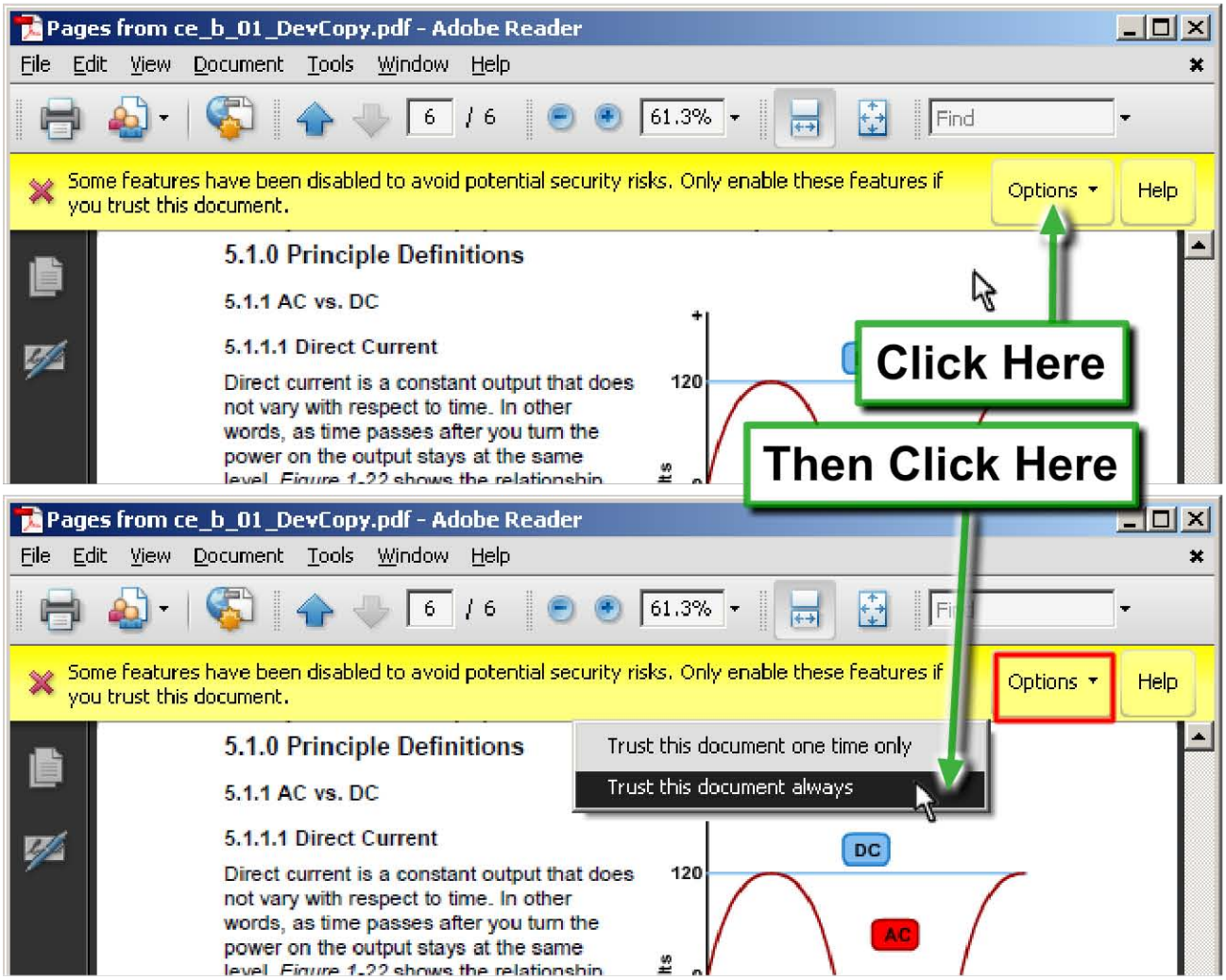
The Interactive features of this manual are currently disabled.

Many graphics will not appear correctly unless these features are turned on. You should either see a popup window, or a yellow banner at the top of the application. To enable the Interactive features of this manual follow the steps illustrated below:

If you see a popup window do the following:



If you see a yellow banner, do the following:



Once you have completed either of the above procedures the features will be enabled for this document, and this warning won't appear again after you leave this page.

Chapter 4

Combat Maneuvers, Formations, Patrols, and Ambushes

Topics

1.0.0 Movement

2.0.0 Rushing

3.0.0 Hitting the Deck

4.0.0 Crawling

5.0.0 Moving Silently

6.0.0 Walking Silently

7.0.0 Assuming the Prone Position Silently

8.0.0 Combat Formations

9.0.0 Patrol and Ambush

10.0.0 Reconnaissance Patrol

11.0.0 Patrol Planning and Preparation

12.0.0 Ambush

To hear audio, click on the icon: 

Overview

Moving through enemy-controlled terrain either on your own or in small groups is a dangerous task. Usually in such instances, your movement must not be seen or heard. When this cannot be avoided, you must at least be able to move quickly with a minimum of exposure. Actions, such as moving, rushing, hitting the deck, crawling, moving silently, and taking action under flares, are discussed in this chapter.

Objectives

When you have completed this chapter, you will be able to:

1. Specify methods of moving individuals and formations in a combat area and conditions under which individual methods should be used.
2. Indicate actions to be taken by an individual when caught in the light of an overhead or ground flare.
3. Differentiate between types of fire team formations relative to purpose, use, and their limitations under given combat conditions; specify the duties of the fire team leader assigned to basic fire team formations and movements.

4. Specify the kinds of rifle squad formations used in given combat situations and how squad formations are changed to meet changing tactical situations.
5. Specify the kinds of rifle platoon formations used under given combat conditions.
6. Specify the purpose and use of the weapons unit formation during an attack.
7. Describe a patrol in terms of its objective and orders.
8. Define the duties and positions of patrol personnel and techniques of control, security, and movement.
9. Define the duties and positions of patrol personnel and techniques of control, security, and movement.
10. Point out principles and techniques of ambush.

Prerequisites

There are no prerequisites for completing this manual.

Features of this Manual

This manual has several features which make it easy to use online.

- Figure and table numbers are italicized within the handbook text. Figure and table reference numbers are conveniently located next to (or near) the applicable handbook text.
- Audio and video clips are included in the text, with italicized instructions telling you where to click to activate the appropriate link.
- Review questions are included at the end of this chapter as the chapter assignment. To submit assignments log into https://www.courses.netc.navy.mil, go to “Student Services”, in the drop down click on “Active Courses”, go to "View/Submit Answers" next to the course you wish to submit answers for. Assignments may be submitted to the above Web site as they are completed, and instant scoring is available. Your completion letter is available as soon as you pass all assignments.
- A form at the end of each chapter allows your input for improving the manual or correcting errors to be brought to the attention of CSFE’s Technical Review Committee. Your input is important and will help keep this manual up to date and free of technical errors.

1.0.0 MOVEMENT

When moving in a combat situation, it is best to travel a short distance quickly; then stop, listen, observe, and move on again. Before moving from the concealment or cover of one position, always pick out the next position. In addition, look for an alternate new position in case the original cannot be reached. Observe the area carefully for enemy activity; then select the best available routes to the new location. Take advantage of darkness, fog, smoke, or haze to assist in concealing movement.

Change direction from time to time when moving through tall grass. When moving in a straight line, the grass waves with an unnatural motion that could attract attention. The best time to move is when the wind is blowing the grass.

When stopping between movements, observe briefly whether birds or animals are alarmed. Their flight or movement may attract the attention of the enemy, or they may provide a clue as to the location of the enemy.

Take advantage of distractions caused by noises, such as bombing, shelling, rifle fire, or vehicle movement.

Travel across roads, trails, and rivers where the most cover and concealment exists. Search for a large culvert, a low spot, or a curve; keep in mind that these are the most likely spots for enemy mines and booby traps. Avoid steep slopes and areas with loose stones or gravel. Also, avoid ridges or clearings where it is possible to make a good silhouette.

2.0.0 RUSHING

Rushing is the fastest means of moving from one position to another. It should always be used when moving and not concealed. Generally, start rushing from the prone position (*Figure 4-1, frame 1*). Slowly move your head to select the new position to move (*Figure 4-1, frame 2*). Avoid raising your head too high, and always look around the side of an object rather than over the top, to avoid making a sharp silhouette. Slowly lower your head; then draw your arms in close to the body; keep elbows down, and pull your right leg forward (*Figure 4-1, frame 3*). With one movement, raise your body by straightening your arms (*Figure 4-1, frame 4*). Spring to your feet quickly, step off with the left foot (*Figure 4-1, frame 5*), and run to the new location by the quickest and shortest route. Keep low and use all available cover (*Figure 4-1, frame 6*).



Figure 4-1 — Rushing and hitting the deck.

Interaction Available

3.0.0 HITTING THE DECK

After reaching the new position at the end of the rush, quickly get into the prone position again. Getting into the prone position from rushing is known as hitting the deck or dirt. To do this, plant your feet firmly—about 18 inches apart—and while sliding your hand to the heel of the rifle butt (*Figure 4-1, frame 7*), drop to the knees (*Figure 4-1, frame 8*). Fall forward, breaking the fall with the butt of the rifle (*Figure 4-1, frame 9*) unless you are armed with the M16; then, after shifting weight to the left side, bring the rifle forward (*Figure 4-1, frame 10*). Place the butt of the rifle in the hollow of the firing shoulder; then roll into a firing position (*Figure 4-1, frame 11*). If the weapon has a stock made of plastic or fiberglass, such as the M16, do not use it to break the fall. Instead, grasp the rifle in one hand and break the fall with the other.

Lie as flat as possible. If it was possible the enemy detected the movement, move to the right or left, preferably where there is cover and concealment.

4.0.0 CRAWLING

There are times when a person must move with their body close to the ground to avoid enemy fire or observation. There are two ways of doing this, the LOW CRAWL and the HIGH CRAWL. It is up to the individual to decide which method is best suited to the conditions of visibility, cover and concealment, and the speed required.



Figure 4-2 — Low crawl.

Use the LOW CRAWL method when cover and concealment are scarce, when visibility permits good enemy observation, and when speed is not essential. Keep your body as flat as possible against the ground. Grasp the rifle sling near the upper sling swivel. Allow the balance to rest on the forearm, and let the butt drag along the ground. Keep the muzzle and operating rod clear of the ground (*Figure 4-2, frame 1*).

To start forward, push your arms ahead and pull the right leg forward (*Figure 4-2, frame 2*). Move by pulling with your free arm and pushing with the right leg. Every so often, change the pushing leg to avoid getting tired (*Figure 4-2, frame 3*).

Use the HIGH CRAWL method when cover and concealment are available, when poor visibility reduces enemy observation, and when more speed is needed.

Interaction Available

Keep your body off the ground and rest your weight on the forearms and lower legs. Cradle the rifle on your arms, keeping the muzzle off the ground. Keep your knees well behind the buttocks so the rump remains low. Move forward by alternately advancing with your right elbow and left knee and then left elbow and right knee (*Figure 4-3*).



Figure 4-3 — High crawl.

The low crawl and high crawl are not suitable for moving silently. To crawl silently, move on your hands and knees: Start by laying the weapon carefully on the ground to the side (*Figure 4-4, frame 1*). With your right hand, feel or make a clear spot for the knee. While keeping your hand on the spot, bring the right knee forward until it meets the hand (*Figure 4-4, frame 2*). Next, clear a spot with your left hand and move the left knee up in the same manner. Be sure the weapon is always within reach! To move the weapon, feel for a place, clear a spot, and lift the weapon into position. Crawl very slowly and keep movements absolutely silent.

5.0.0 MOVING SILENTLY

The rushing and crawling movements just explained are not particularly useful when close to the enemy because they often create a shuffling noise. When extremely quiet movement is necessary, especially when on patrol or stalking an enemy, use the movements described below. These movements are particularly useful when moving at night. The movements must be made slowly; they are tiring and require extreme patience and self-control to be performed properly.



Figure 4-4 — Crawling silently.

6.0.0 WALKING SILENTLY

While walking, hold your weapon at port arms. Make footing sure and solid by keeping your weight

Interaction Available

on one foot while stepping with the other. When stepping, raise your foot high. This enables the feet to clear the brush and grass. With all the weight on the rear leg, gently let down the foot of the forward leg, toe first (*Figure 4-5*). Feel softly with toe to pick a good, solid spot; then lower the foot. Shift weight and balance to the foot that is forward and then continue. Take short steps to avoid losing balance. At night and when moving through dense vegetation, avoid making unnecessary noise by holding the weapon with one hand and extending the other hand forward to feel for obstructions while moving.

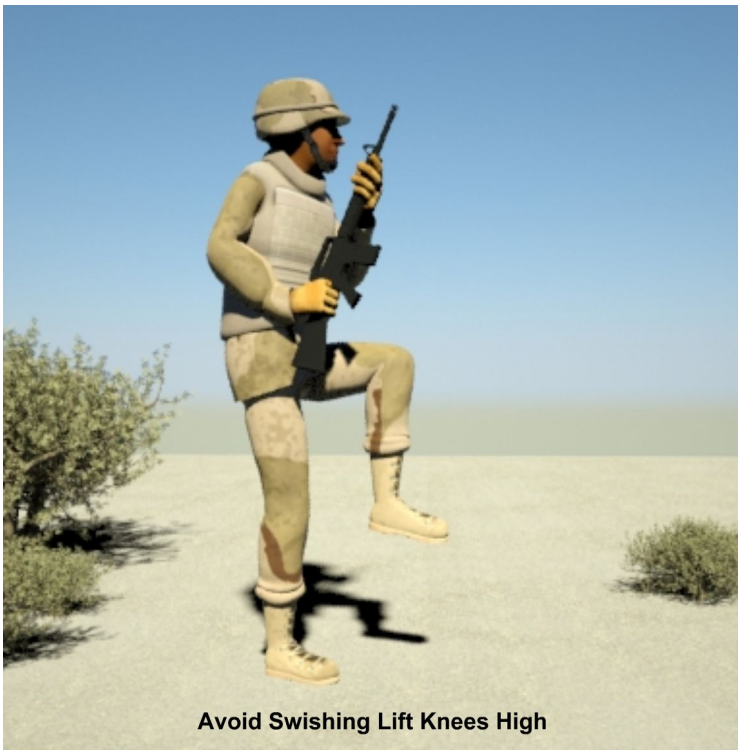


Figure 4-5 — Walking gently while placing the toe down first.

7.0.0 ASSUMING THE PRONE POSITION SILENTLY

To assume the prone position silently, hold the weapon under one arm and crouch down slowly (*Figure 4-6, frame 1*). Feel for the ground with one hand, making sure it is clear by removing small twigs and other objects that make noise. Lower knees one at a time until your weight is on both knees and your free hand (*Figure 4-6, frame 2*). Shift your weight to the free hand and opposite knee. Raise the free leg up and back slowly; then lower it to the ground gently, feeling with your toe for a clear spot (*Figure 4-6, frame 3*). Roll gently to that side and move your other leg into position in the same way. Roll quietly into the prone position (*Figure 4-6, frame 4*).



Figure 4-6 — Assuming the prone position silently.

Interaction Available

Interaction Available

7.1.0 Action under Flares

7.1.1 Reacting To Ground Flares

The enemy puts out ground flares as warning devices. They can be set off by either the enemy or there can be trip wires attached so you set them off. Usually the flares are set up in a position so the enemy personnel can watch and see when they are set off.

If you are caught in the light of a ground flare (*Figure 4-7*), move quickly out of the lighted area. The enemy will know where the ground flare is and will be ready to fire into that area. Move well away from the lighted area. While moving out of the area, look for other team members. Try to follow or join them to keep the team together.



Figure 4-7 — Reacting to ground flares.

The sudden light of a bursting flare may temporarily blind both you and the enemy. When the enemy uses a flare to spot you, he spoils his own night vision. To protect your night vision, close one eye while the flare is burning. When the flare burns out, the eye that was closed will still have its night vision.

7.1.2 Reacting To Aerial Flares

The enemy uses aerial flares to light up vital areas. They can be set off like ground flares; fired from hand projectors, grenade launchers, mortars, and artillery; or dropped from aircraft.

If you hear the firing of an aerial flare while you are moving, hit the ground (behind cover if possible) while the flare is rising and before it bursts and illuminates.

If moving where it is easy to blend with the background (such as in a forest) and you are caught in the light of an aerial flare (*Figure 4-8*), freeze in place until the flare burns out.

If you are caught in the light of an aerial flare while moving in an open area, immediately crouch low or lie down.

If you are crossing an obstacle, such as a barbed-wire fence or a wall, and get caught in the light of an aerial flare, crouch low and stay down until the flare burns out.

If assaulting an enemy position and a flare bursts, it is imperative to continue the assault.

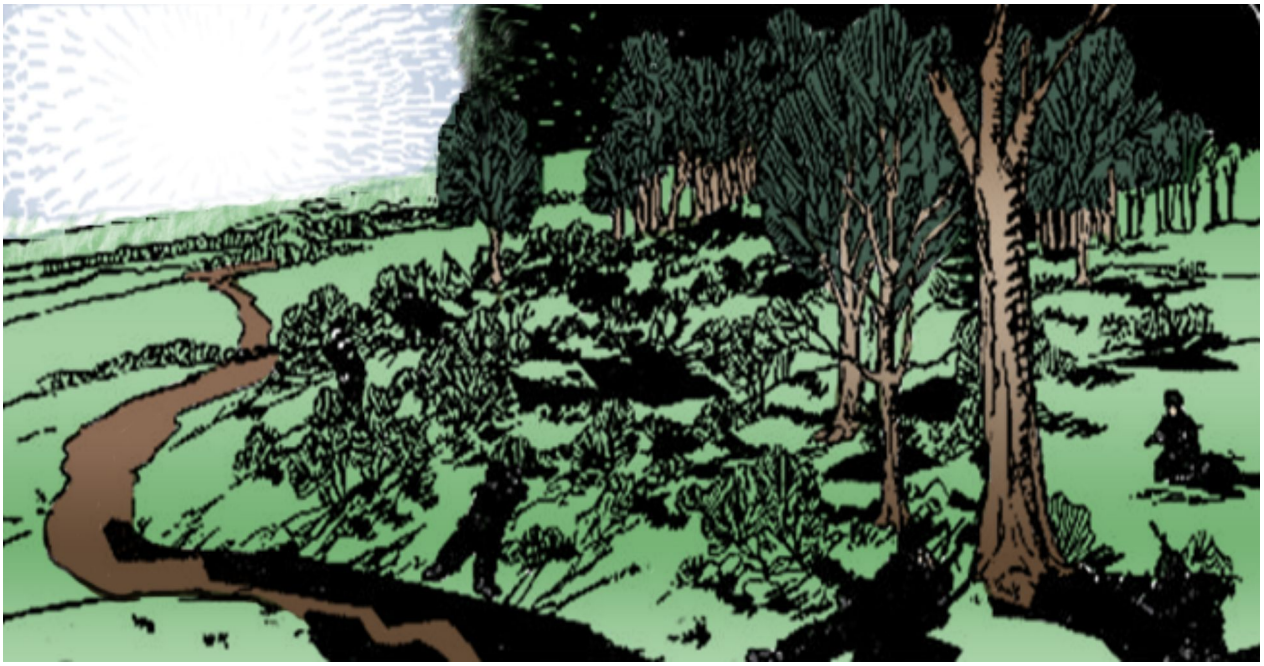


Figure 4-8 — Reacting to aerial flares.

8.0.0 COMBAT FORMATIONS

Combat formations are designed to group individuals into effective fighting teams that can move to and assault an enemy position with minimum confusion. The use of combat formations, with related arm-and-hand signals, enables a squad leader to control the fire and to maneuver their unit just as the quarterback of a football team uses plays and signals. A person who cannot remember the plays or signals on the ball field endangers the ability of the team to win the game. On the battlefield, the stakes are much higher. The success of the mission, as well as survival, depends on teamwork.

When the situation, terrain, or enemy activity does not permit close formations, the unit leader should deploy the team in an extended formation. Deployment is executed on signals or commands. The leader may deploy the unit in a variety of formations at any one time, depending on the situation. Relative positions within these formations are flexible, and the leader should take advantage of the cover and concealment offered by the terrain; however, they must take care not to mask the fire of another unit. Maintaining exact distances between individuals and units is unnecessary as long as control is not lost; however, under ideal conditions, the recommended space between individuals is 5 yards. All leaders and units must maintain sight and voice contact with each other. Any changes in formation should be by the shortest practical route. Leaders must take full advantage of cover and concealment and avoid backward or lateral movement.

8.1.0 Fire Team Movement

The FIRE TEAM LEADER controls the use of the formations. They are placed in a position where they can best observe and control the fire team and, in addition, receive orders from the squad leader. The fire team leader must also be in a position to quickly and effectively control the employment of the automatic rifle.

The AUTOMATIC RIFLEMAN is an interior person. They should position themselves between the fire team leader and rifleman No. 1. Here, they can quickly deliver fire to either flank, as directed by the fire team leader, or receive help and protection from the adjacent rifleman.

RIFLEMAN NO. 1 assists the automatic rifleman by keeping the supply of loaded magazines ready and therefore keeps the automatic rifle in action. Rifleman No. 1 coordinates both position and movement with those of the automatic rifleman.

RIFLEMAN NO. 2 is at the place in the fire team formation that enemy action or probable enemy action threatens. This person acts as a security element; for example, when the team is moving toward the enemy, they are in the foremost position.

The basic fire team formations are COLUMN, WEDGE, SKIRMISHERS RIGHT or LEFT, and ECHELON RIGHT or LEFT.

8.1.1 Fire Team Column

The fire team column formation (*Figure 4-9, frame 1*) is used when speed and control are governing factors, such as moving through woods, fog, smoke, and along roads and trails. This formation is favorable for fire and maneuvers to either flank but is vulnerable to fire from the front because its own fire in that direction is limited.

8.1.2 Fire Team Wedge

The fire team wedge formation (*Figure 4-9, frame 2*) is used when the enemy situation is unknown but contact is possible. When the terrain and the visibility require dispersion of the men, the wedge formation provides all-around protection and flexibility and is easy to control.

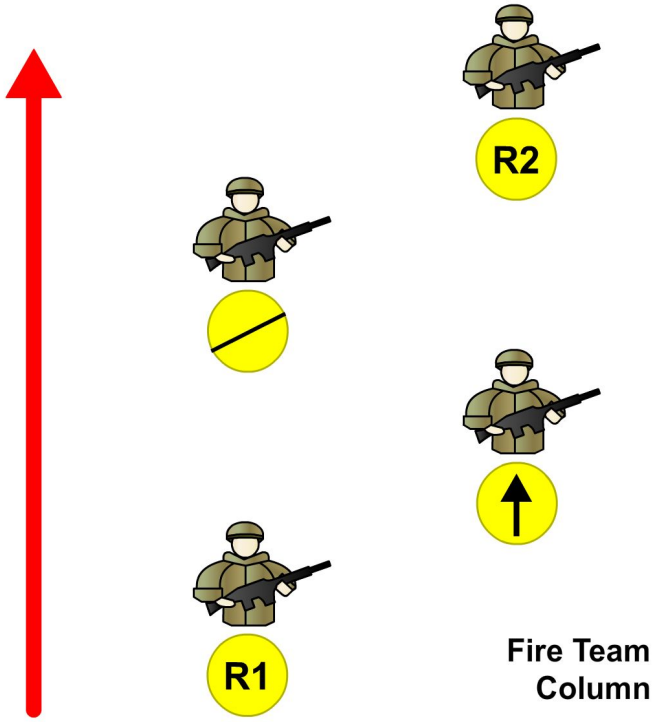


Figure 4-9 — Fire team formations.

8.1.3 Fire Team Skirmishers Right or Left

Fire team skirmishers right or left (*Figure 4-9, frame 3 and 4*) can be used most effectively when assaulting a known enemy position. It is also useful for “mopping up” operations (searching for enemy stragglers) and crossing short, open areas. Because the fire team is in a line, skirmishers right or left provides maximum firepower to the front. However, the formation is difficult to control.

8.1.4 Fire Team Echelon Right or Left

Fire team echelon right or left (*Figure 4-9, frame 5 and 6*) is used primarily to protect an exposed flank. This formation permits heavy firepower to both the front and the direction of echelon. As with skirmishers, the formation is difficult to control; therefore, movement is generally slow, especially during conditions of reduced visibility.

Interaction Available

8.1.5 Changing Fire Team Formations

Depending upon the changing terrain features or the tactical situation, the fire team leader should change formations to meet these new conditions. *Figure 4-10, frames 1-6* show the manner in which each individual moves when changing from one formation to another.

8.1.6 Rifle Squad Formations

The squad formations are similar to those of the fire team. However, an additional formation known as the SQUAD VEE is used by the squad, and skirmishers right or left is called SQUAD LINE.

The SQUAD LEADER designates the type of formation to be used, and is placed in a location where they can readily observe their fire teams and the enemy. Normally, the fire team formation within the squad formation is left to the discretion of the fire team leader. For example, the squad may be in SQUAD VEE, but the fire team(s) may be in the fire team wedge (*Figure 4-, frames 1-6*). The exact formation is flexible at any level and is influenced by the terrain and the circumstances.

The grenadier always remains close to the squad leader regardless of the formation. Their exact location in any formation depends upon the orders of the squad leader.

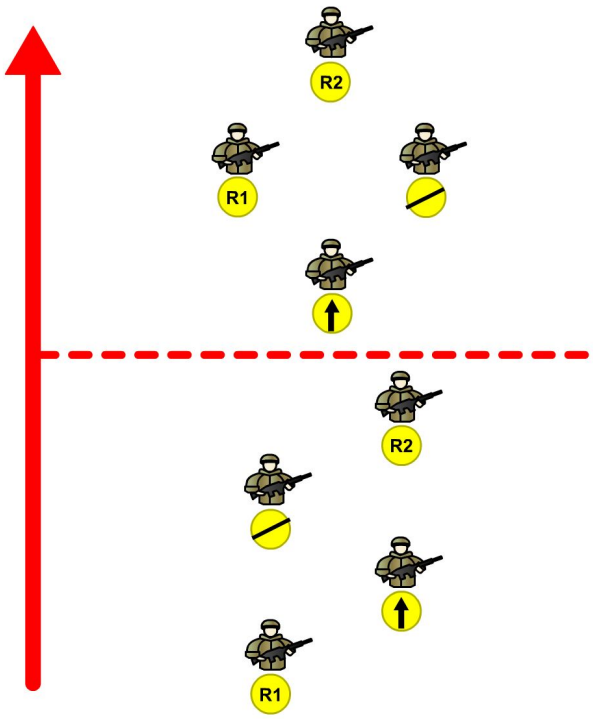


Figure 4-10 — Changing fire team formations.

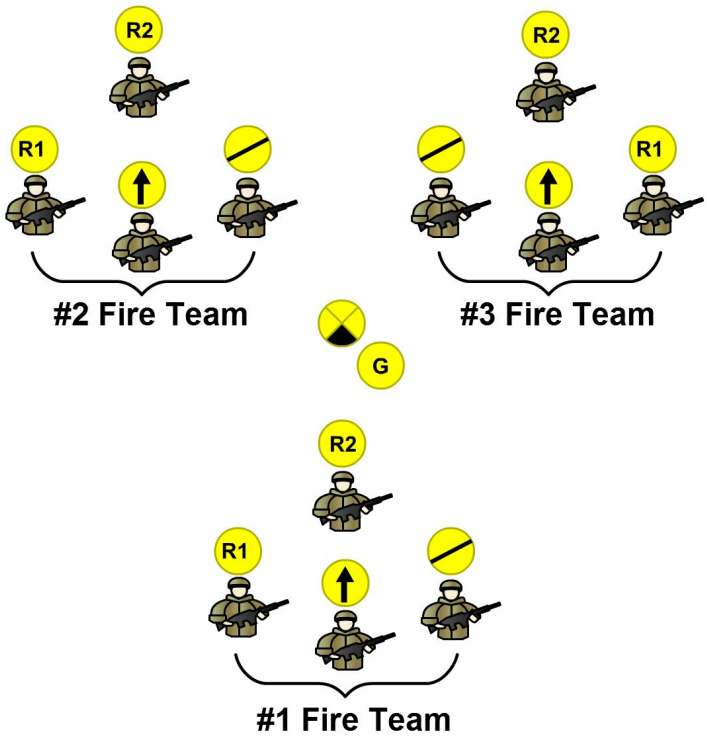


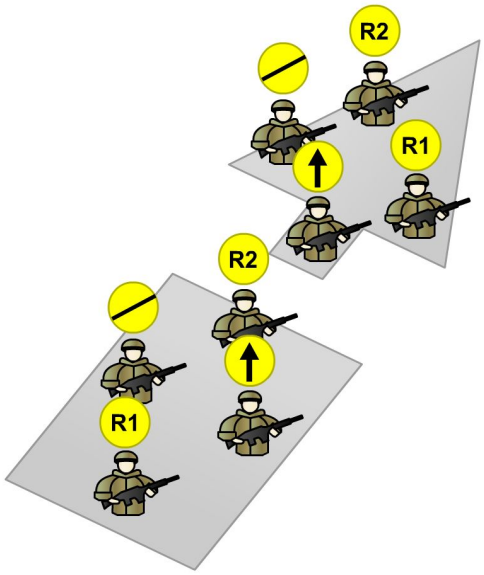
Figure 4-11— Rifle squad formations.

Interaction Available

Interaction Available

8.1.6.1 Squad Column

In SQUAD COLUMN (*Figure 4-12, frame 1*), the fire teams are arranged in succession, one behind the other. This formation is vulnerable to fire from the front, but controlling and maneuvering are easy. It is especially suitable for low, covered routes of advance; for maneuvering through gaps between areas receiving hostile artillery fire; for maneuvering through woods; and for moving in fog, smoke, or darkness.



Column to Wedge

Figure 4-12 — Rifle squad formations (continued).

8.1.6.2 Squad Wedge and Squad Vee

The squad wedge (*Figure 4-12, frame 2*) and squad vee (*Figure 4-11*) formations provide good security to both the front and the flanks. These formations are relatively easy to maneuver and control and can be quickly adapted to meet new tactical situations. The nature of the terrain generally determines which of the two formations should be used, the amount of frontage to cover, and the proximity and actions of the enemy.

8.1.6.3 Squad Echelon Right or Left

In squad echelon right or left, the fire teams are placed diagonally, one behind the other (*Figure 4-12, frame 3*). This formation is used to protect an exposed flank, particularly when the enemy is known to be on that flank. From this formation, maximum firepower can be promptly delivered to the right or left flank or toward the right or left front.

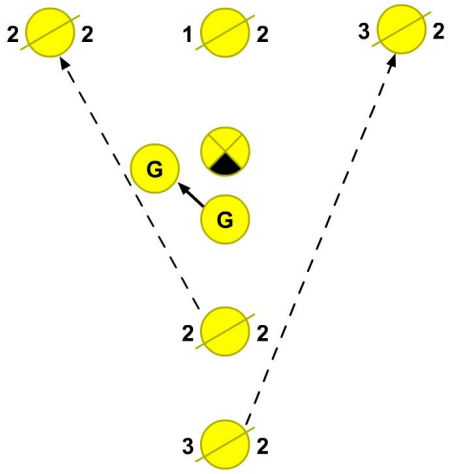
8.1.6.4 Squad Line

The squad line, as the name implies, places all three fire teams on a line abreast of one another (*Figure 4-12, frame 4*). This permits maximum firepower to the front in the shortest time, so the squad line is used extensively during an assault on a known enemy position. The squad line is suitable for rapidly crossing an unavoidable open area covered by enemy machine guns or artillery.

Interaction Available

8.1.6.5 Changing Squad Formations

Squad leaders change squad formations in the same way and for the same reasons as the fire team leaders change the fire team formations. *Figure 4-13, frames 1-8* show these changes. Notice that the first fire team is used as a pivot for all formations and that the other fire teams take the most direct route to their new location. Although any formation shown can also be used to show the opposite movement, remember that all movement is to the front. For example, *Figure 4-13, frame 1* shows a squad column moving to the squad line. To move from the squad line back into the squad column, fire teams two and three would not move to the rear and fall in behind team one. Instead, fire team one would move forward rapidly. Then teams two and three would move at a forward angle in behind it.



Squad Column to Squad Line

Figure 4-13 — Changing squad formations.

8.1.7 Rifle Platoon Formations

The platoon commander selects the initial attack formation for the platoon. However, the platoon commander may change this formation as the attack progresses to meet a changing tactical situation. The available avenues of approach toward the enemy affect the platoon commander's choice to a great degree. Also, the need for security, control, flexibility, and speed influences the choice. On occasion, the platoon commander may prescribe the initial formation of the fire teams within the squads. Platoon formations (*Figure 4-14*) are similar to squad formations and are described below.

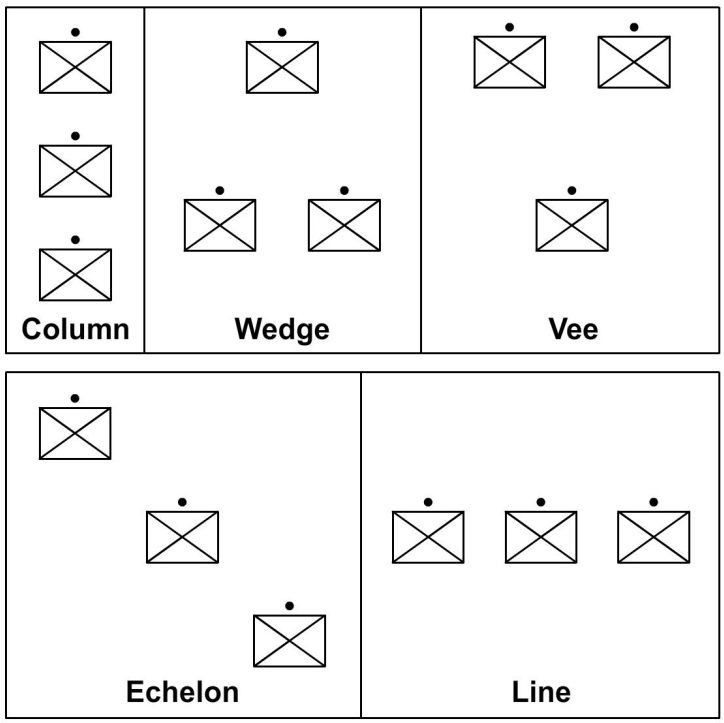


Figure 4-14 — Rifle platoon formations.

Interaction Available

8.1.7.1 Platoon Column

The platoon column makes control easier and action to the flanks favorable. It uses minimum firepower in a forward direction and is useful when speed and control are governing factors and when visibility is limited. The platoon column is suitable for advancing through narrow covered avenues of approach with maximum speed and control.

8.1.7.2 Platoon Wedge

The platoon wedge makes control easier, provides good all-around security, and is extremely flexible. It permits reasonable firepower to both the front and the flanks. When the enemy is known to be in the area but the exact strength and location are unknown or not clear, the platoon wedge should be used. Also, it is useful when the terrain and visibility require a greater dispersion of the platoon. The wedge tends to keep the bulk of the platoon from becoming engaged with the enemy too soon. It also permits flexibility in the employment of squads when contact is established.

8.1.7.3 Platoon Vee

The platoon vee uses movement into the platoon line formation. The platoon vee provides excellent firepower to both the front and the flanks, and it is useful primarily when the strength of the enemy and their location to the front are known. The platoon vee is easy to control and provides good security but is less maneuverable than the wedge.

8.1.7.4 Platoon Echelon Right or Left

The platoon echelon right or left formations are hard to control; therefore, movements are slow and maneuvering difficult. However, it does provide heavy firepower to the front and in the direction of echelon. The platoon echelon is used primarily in protecting an exposed flank either right or left.

8.1.7.5 Platoon Line

The platoon line formation allows the platoon to deliver maximum firepower to the front. It is difficult to control and is most often used in the coordinated assault of all three squads.

8.1.7.6 Changing the Platoon Formation

Generally, the relative positions of the squads within the platoon remain fairly constant. However, since combat is unpredictable, changes are often necessary. As usual, these changes must be made as rapidly and smoothly as possible.

Platoon formation changes are identical to those of the squads. The platoon commander, along with the staff, tries to stay in a central location to best observe the situation and to control the attack.

8.1.8 Rifle Company Attack Formations

The rifle company commander distributes the company into three elements: a main attacking force, a supporting attack force, and a reserve force. Attacking forces, fire support forces, and the reserves are all specifically designated in an ATTACK ORDER issued by the senior commander. Usually, the supporting attack is an attack by fire, whereas one or more rifle platoons maneuvering to seize the assigned objective(s) compose the main attack force. The supporting attack force may contain units from the

weapons platoon. In fact, the two major construction or rifle companies (Charlie and Delta) of a construction battalion each have their own weapons platoon. The reserve force is kept to the rear of the attacking forces where it can readily move to the attack should the need arise. There are no fixed conditions to determine the most appropriate formation for a given situation. The company commander must weigh all circumstances of terrain, the strength and location of the enemy, and the friendly fire support available to decide on one of the following attack formations (*Figure 4-15, frames 1-8*).

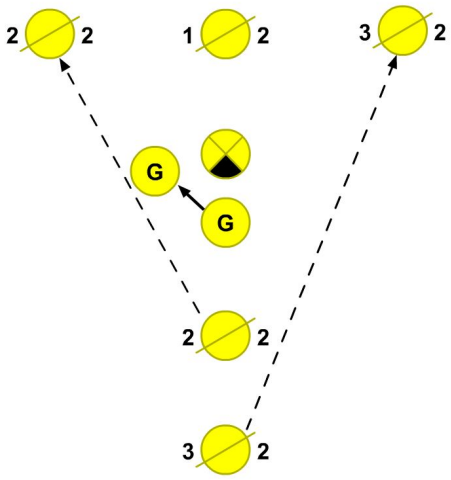


Figure 4-15 — Rifle company attack formations.

Interaction Available

8.1.8.1 One Platoon in Attack

A formation of one platoon in attack and two platoons in reserve provides limited firepower to the front and a strong reserve. This formation should be used when information about the enemy is vague or when the company attacking has one or both flanks exposed. This formation may be used when only a single, narrow avenue of approach is available or when attacking to seize an objective deep in enemy territory. The reserve platoons may follow the attacking platoon in company column, or they may be positioned to protect one or both flanks. This formation provides a lot of variety in positioning and moving reserve platoons and allows the company commander maximum flexibility in maneuvering and controlling these platoons.

8.1.8.2 Two Platoons in Attack

Two platoons in attack and one platoon in reserve provide moderate firepower to the front while retaining a reserve large enough to influence the action. This formation may be appropriate when relatively detailed information concerning the enemy is available.

8.1.8.3 Three Platoons in Attack

When formation has three platoons in attack and none in reserve, the company lacks a reserve force to influence the action. This formation provides maximum firepower to the front and is useful when a wide area must be cleared rapidly or when the enemy situation is known.

9.0.0 PATROL AND AMBUSH

A patrol is a detachment of troops sent out from a larger body on a mission of combat, reconnaissance, security, or contact with friendly units. There are two general classes of patrols—reconnaissance and combat—either of which could have a mission of security. The classification is derived from the mission assigned to a patrol. The Seabees are

primarily concerned with defensive combat; therefore, when training in patrolling, emphasis should be on security patrolling, rather than aggressive patrolling.

In security patrolling, both reconnaissance (recon) and combat patrols are used. The typical Seabee defense is a static defense; therefore, the recon patrol is mainly used to detect enemy movement toward the position. The combat patrol is used to destroy enemy recon patrols and to delay and confuse an enemy attack.

10.0.0 RECONNAISSANCE PATROL

Reconnaissance patrols are sent out to gain information about the enemy or the terrain. These patrols engage in combat only when it becomes necessary to accomplish their mission or to protect themselves. In general, they should avoid combat and accomplish their mission by stealth.

Reconnaissance patrols have a variety of missions, but their primary mission is to obtain and report information in a timely manner to the commander who desires it.

A reconnaissance patrol might be dispatched to do the following:

- Locate and observe the characteristics of a hostile position or installation.
- Investigate a possible route of march for an enemy force.
- Investigate a certain terrain feature or the general nature of the terrain in a given locality.
- Patrol the perimeter of the defense area in a static defense. Of primary importance are enemy troop buildup or movement and the type of weaponry in their possessions.

The missions mentioned above are by no means all-inclusive and are provided merely as examples.

10.1.0 Primary and Secondary Missions

A patrol should never be given more than a single primary mission. However, an ALTERNATE mission can be assigned that may be carried out if the primary mission cannot be achieved. In addition, Secondary missions may be assigned when they are consistent with carrying out the primary or alternate mission.

10.2.0 Size of Patrols

A patrol may consist of two Seabees, a fire team, or a larger tactical unit. The size of a combat patrol or reconnaissance patrol depends on several influencing factors that must be considered before the patrol is dispatched. Sometimes, a small patrol may be able to execute the mission. At other times, a strong combat patrol may be needed. In general, a patrol is comprised of the least number of Seabees needed to carry out a given mission, with careful thought given to safety, time available, and messenger requirements.

The size of a patrol is influenced by the following factors:

- Mission
- Terrain and visibility
- Distance from friendly troops
- Time the patrol will be out

- Number of messages the patrol may have to send back
- Whether prisoners are to be captured and sent back

Patrols with missions requiring combat or a strong likelihood of combat are usually stronger than patrols on reconnaissance missions. Also, when a patrol intends to be gone for some time and is going to operate at a considerable distance from friendly troops, the patrol must be stronger because there is greater danger from enemy attack.

A reconnaissance patrol rarely exceeds a squad in size. Units larger than a squad are too noisy, more difficult to control, move more slowly, and have greater difficulty approaching the enemy without detection. The fire team is ideal for short-range reconnaissance patrols.

The patrol leader receives a PATROL ORDER containing all the instructions, information, and guidance needed to plan, prepare for, and accomplish a particular type of mission.

A patrol order varies according to circumstances, such as checkpoints, general route, and communications plan.

The TIME OF DEPARTURE may be in general terms: “Leave after dark” or “Leave before daylight.” However, a patrol order may give a specific time of departure to avoid congestion in a particular area, to reduce the possibility of collision between patrols, to maintain strict control by the command, or for other reasons.

The TIME OF RETURN may be either general or specific. Information obtained by a reconnaissance patrol can have a significant impact on future combat operations. Every effort must be made to provide reports at the time(s) specified.

CHECKPOINTS are points along the patrol route from which the patrol is expected to report in—usually by radio.

The GENERAL ROUTE is usually designated by checkpoints. An exact route is seldom feasible except in reconnaissance. When a command desires to maintain strict control of the patrol, the order may specify an exact route.

The COMMUNICATIONS PLAN lists the reports the patrol must make and the medium (usually radio) by which they are to be sent.

10.3.0 Patrol Formations

A particular patrol formation should provide for all-around security and good control. The formation chosen should be such that only a minimum number of Seabees within the patrol are likely to be pinned down at any one time by surprise fire.

Patrol formations must be fluid and flexible. They must be changed to meet varying terrain and visibility conditions. The patrol leader designates the original formation. Individual members then maintain assigned positions as long as they can see each other and, at the same time, make full use of available cover and concealment.

Patrols use basic combat formations. For small patrols in open terrain, the wedge is a suitable formation. For larger patrols, or when visibility becomes restricted, the column formation (with its necessary security elements), should be used.

When enemy contact is near or has already been made, patrol leaders should adopt more deployed formations.

Normally, the following factors influence and change a patrol formation:

- Mission

- Terrain
- Visibility
- Enemy situation
- Size of patrol
- Required speed of movement

The formations taken by a patrol are ALWAYS influenced by the need for maintaining:

- Security,
- The mission
- The route of the patrol

10.4.0 Control

The patrol leader is placed where they can best maintain control. Normally, this is at, or near, the head of the patrol but depends somewhat upon the patrol route. When the route is clearly defined, the leader should take a position within the patrol wherever patrol members can best see the signals. If the route is ill defined as in dense woods, jungle, or at night, the leader must be in, or with, the leading group.

The second in command—the assistant patrol leader—assists the patrol leader in controlling the patrol. They help the patrol leader by controlling the rear of the patrol and by preventing Seabees from falling behind or getting out of position. They are continually alert for signals or orders and watch to see the other members receive those orders or signals. They observe the rear to prevent the patrol from attack from that direction. They are ready to assume command of the patrol if the leader becomes a casualty.

Patrols are controlled in the daytime by arm-and-hand signals and oral orders. Each member of a patrol must be thoroughly familiar with the standard arm-and-hand signals. Before contact with the enemy has been made, the patrol leader must issue the orders. Oral orders are a sure means of control. Commands should be just loud enough to be heard by patrol members. When near the enemy, halt the patrol before issuing orders. The leader moves from man to man and quietly provides instructions. Sound signals may be used if they will not be confused with other noises. When a sound signal is to be used, the patrol leader should rehearse it before beginning the patrol. Control by voice is usually better than by other sound signals.

Though darkness helps a patrol move close the enemy without being detected, it increases the problem of control. To overcome this, each Seabee is required to keep in sight of the person to their front and flank. This procedure ensures everyone is in position to receive signals and orders.

10.5.0 Security

All-around security must be maintained at all times. This is done within a patrol by using formations that provide protection to the front, flanks, and rear. These elements are the eyes, ears, and fingers of the patrol leader. The patrol moves by following the signals. They must maintain contact at all times, except when a bush or small terrain feature briefly gets in the way. To maintain contact with the patrol leader, security elements must glance in their direction every few steps.

10.5.1 Point and Scouts

Small patrols may use only one person or as many as a fire team as the point. The size depends on the enemy situation, terrain, and patrol route. Normally, a squad-size patrol uses two riflemen as scouts; however, should the patrol come into a dangerous area or get too close to the enemy, the leader might increase the number in the point. The leader may use an entire fire team to cover the advance of the patrol.

The automatic rifleman moves slightly behind the rest of the fire team. From this position, the automatic rifleman can cover the movements of the scouting element. The size of the point increases in relation to the size of the patrol. The point is responsible for investigating the route of advance immediately to the front of the patrol. When visibility is good, it may precede the main body by as much as 100 yards. The point must always maintain visual contact with the patrol leader.

10.5.2 Flanks

One man on each side may provide flank security for a patrol the size of a squad, or less. The flanks move as directed by the patrol leader. In special instances, a group of two may be necessary. Such a group keeps one person where they can see the patrol leader at all times. That person remains within 100 yards of the leader. The team member farther out remains in sight of the inside member—normally within 20 to 25 yards.

In open terrain, the flankers should investigate cover within 100 yards of the general route of march of the patrol. Flankers may become impractical because of reduced visibility in dense woods or jungle. Then the group normally assigned to flank protection move with the patrol itself. They maintain close observation to their assigned flank.

10.5.3 Rear Point

A small patrol normally has only one rifleman assigned as rear point. The rifleman remains in sight and within about 50 yards of the last member of the patrol. This rifleman maintains rear security for the patrol by constantly observing to the rear. If the patrol is ambushed, they stay out of the firefight. If the patrol is annihilated, or obviously will be, they are the getaway person and return to friendly lines to report the situation. The rear point varies in size, depending on the enemy situation and the size of the patrol. Usually, keeping a sharp lookout to the rear to prevent a surprise enemy attack from that direction is necessary.

10.6.0 Movements

Before leaving friendly lines, the patrol leader must select a route to the final destination; this may be done on a map, on an aerial photograph, or on the actual ground to be covered. Intermediate objectives should be selected along that route. These successive objectives regulate the progress of the patrol.

A patrol should always designate one or more rally points where it can reassemble if it is dispersed, ambushed, or surprised by enemy attack. Normally, an intermediate objective becomes the rallying point as the patrol moves beyond it. In this way, the patrol leader can be sure each individual of the patrol is thoroughly familiar with the rallying point locations.

Members of a dispersed patrol should try to reach the designated rallying point quickly so the mission may be readily resumed. If the patrol leader does not arrive within a

reasonable period of time, the second in command must reorganize the patrol and carry out the mission.

10.7.0 Special Organization

A special organization is simply a general organization varied to suit a particular mission or a particular set of circumstances. For example, in area reconnaissance, a patrol might be organized into several reconnaissance teams with each team providing its own security and NO separately organized security element; however, the patrol leader uses the same security techniques used for a day patrol, modifying them only as necessary.

11.0.0 PATROL PLANNING AND PREPARATION

For a patrol to succeed, all members must be well trained, briefed, and rehearsed. The patrol leader must have a complete understanding of the mission and a thorough understanding of the enemy and friendly situations. The patrol leader should make a complete reconnaissance of the terrain to be covered (either visual or map), and must issue an order to the patrol, supervise preparations, and conduct rehearsals.

The patrol leader organizes and prepares the patrol by using the six troop-leading steps to make the best use of resources available. To organize thinking, the patrol leader uses the acronym **BAMCIS**, which consists of:

1. **B**egin planning.
2. **A**rrange for reconnaissance and coordination.
3. **M**ake reconnaissance and complete the estimate.
4. **C**omplete the plan.
5. **I**ssue the order.
6. **S**upervise.

11.1.0 Begin Planning

The patrol leader begins by evaluating all factors affecting the mission. The patrol leader looks for possible courses of action that lead to a decision, and then transforms this decision into an order. The first step includes making an initial assessment and decision on using available time, issuing a warning order and initial preparatory tasks, and initiating the estimate.

The initial planning effort assesses the time, assistance, and information available, and plans the proper use of each. Time allowances include reconnaissance; completion of the estimate and order; troop preparation; and such briefings, rehearsals, and inspections as required before beginning the patrol.

The patrol leader reviews the mission and the attachments and/or support available and decides what preparatory efforts must begin immediately. Proper use of subordinates to manage these initial tasks during this period reduces preparation time and frees the patrol leader for proper planning and reconnaissance. A warning order is issued using a modified five-paragraph order format (**S**ituation, **M**ission, **E**xecution, **A**dministration and logistics, and **C**ommand and signal [**SMEAC**]) as a checklist.

Once the initial preparations are set in motion, the patrol leader begins estimating by analyzing the mission; considering the friendly, enemy, and operating environments; considering each course of action available against what the enemy might do; comparing the courses of action in terms of mission accomplishment, capabilities, and

probable casualties; and choosing one that becomes the basis for concept and order. While the patrol leader should use and organize notes, estimates must be done quickly and accurately—particularly for immediate situations. To organize thinking, the patrol leader uses the acronym **METT-T**, which consists of:

- **M**ISSION—the mission assigned to the patrol and how it relates to the mission of the commander who is sending the patrol
- **E**NEMY—known or suspected enemy presence and capabilities, habits and characteristics, and fighting techniques; for this report, utilize the acronym **SALUTE**.
    - **S**ize of the enemy
    - **A**ctivity
    - **L**ocation
    - **U**nit
    - **T**ime
    - **E**quipment
- **T**ERRAIN and weather—including ground, vegetation, drainage, weather, and visibility
- **T**ROOPS and support available—friendly situation and support available
- **T**IME available—the constraints and impact of time on preparation and mission accomplishment

The estimate begins with mission analysis, which is the most important part of the entire planning process. Here, the patrol leader considers the specified tasks of the mission assigned and identifies other significant actions (specified and implied tasks) that must be undertaken to accomplish the stated mission. These tasks are arranged in sequence of accomplishment. The tasks and sequence create the framework for developing courses of action for the patrol concept of operations.

11.2.0 Arrange for Reconnaissance and Coordination

The patrol leader arranges a personal reconnaissance to observe as far forward as possible and also coordinates with the appropriate commanders for the patrol's "passage of lines" and supporting fires. The patrol leader also coordinates with other patrol leaders who may be operating in the same or adjacent areas and requests that the commander assigning the patrol mission coordinate the patrol action with adjacent commanders, local security, and night defensive fires, as appropriate. The patrol leader may delegate any or all of these arrangements to the assistant patrol leader if the patrol leader requires the time for planning.

11.3.0 Make Reconnaissance and Complete the Estimate

The patrol leader uses personal reconnaissance to answer questions that arise from the map reconnaissance and METT-T evaluation. Specific points include passage points, lanes through obstacles, locations of friendly listening posts and observation posts, possible approach and return routes, enemy positions (if any), and intermediate observation points on the way to the objective.

In selecting approach and return routes, the patrol leader chooses routes that best use concealment and avoid opposition and obstacles. To lessen the chances of ambush by

the enemy, the return trip is planned along a different route. In addition to personal reconnaissance and review of the map and aerial photographs, the advice of other patrol leaders who are already familiar with the terrain and the objective area should be considered.

After compiling information about the situation and possible time constraint, the patrol leader completes an estimate. The first step is developing courses of action, each of which will provide for movement to the objective area, mission accomplishment, and the return, based on the tasks and their sequencing identified in mission analysis. While the eventual concept of operations is presented in order of occurrence, the patrol leader must develop the courses of action by either backward or forward planning. In situations where the objective is well defined and there is sufficient information to plan the action for mission accomplishment (reconnaissance or combat), the patrol leader begins the scheme for accomplishing the mission at the objective and then, planning backwards, considers the options for getting there and back.

The following sections on movement to and return from the objective area, reconnaissance missions, and combat missions discuss methods and options available to the patrol leader in developing the courses of action. The principal variables between courses of action will be who, where, and how in the following:

- Patrol task organization
- Routes to the objective area
- Observation point(s) (reconnaissance patrol), ambush site, form of maneuver, type of ambush (combat patrol), fire support plan
- Return routes

The patrol leader then mentally considers the progress of each course of action (a map or simple sketch is a useful aid) against expected and unexpected enemy action. By comparing the options against each other and prospective enemy opposition, the patrol leader chooses the course of action that has the best chance of success. Included in this mental preview process is the time to determine the patrol plan for unexpected contingencies (enemy attack/counterattack, casualty handling). These contingency actions, together with the selected course of action, become the patrol concept of operations.

Once the patrol leader determines the scheme of maneuver, the fire support required to accomplish the mission is addressed including the firepower organic to the patrol and what additional indirect fire support will have to be provided by other units. When planning for indirect fire support, the patrol leader considers the following questions:

1. Will artillery, mortar, or close air support be required at the objective area (combat patrols)?
2. What artillery and mortar targets exist along the routes to and from the objective area that can be employed by the patrol if it encounters the enemy during movement (reconnaissance patrols and combat patrols)?
3. What additional fire support will be required to cover the patrol’s movement from the objective area back to the friendly area once the enemy is aware of the patrol’s actions at the objective area (combat patrols)?

The effect that casualties have upon the patrol depends upon many factors. Generally, more casualties can be expected in a combat patrol than in a reconnaissance patrol. A patrol may continue on to the objective carrying its casualties, send them back with a

detail of Marines, abort the mission and return the entire patrol with the casualties, or call their parent unit for assistance.

Some factors that determine what action the patrol leader takes are: patrol's mission; unit's standing operating procedure for handling wounded; number of casualties and nature of their injuries; availability of aid, helicopters or other means of casualty evacuation. Helicopter evacuation should only be used for the most serious casualties. For infantry units conducting patrols in proximity to the enemy, helicopter evacuation of casualties may compromise the patrol's mission and force the patrol to return to friendly positions before the mission is completed.

The patrol leader determines the requirement for Nuclear, Biological, and Chemical (NBC) defense equipment. Gas masks should always be carried due to the availability of Riot Control Agents (RCAs) to the enemy. If chemical or biological agents have been employed in the area that the patrol must pass through, protective garments will have to be worn by patrol members for part of or the entire patrol. Wearing extra clothing and carrying extra equipment affects the speed of the patrol's movement. A contingency plan for post patrol decontamination must be developed.

11.4.0 Complete the Plan

At this point, the patrol leader has completed the basic thinking necessary for accomplishing the assigned mission. The patrol leader prepares the patrol order to spell out the details, assign tasks to subordinates, and explain the entire endeavor for ease of understanding by the other members of the patrol.

11.5.0 Issue the Order

The patrol leader asks for a status report on the initial preparatory tasks assigned to subordinate leaders and specialists when the warning order was issued. When the patrol leader has completed planning and initial preparations have progressed to the point where the patrol order may be issued, the members of the patrol are assembled. Roll call is taken to ensure all patrol members are present, and then the prepared order is issued.

This will be the only opportunity for the patrol leader to issue detailed instructions. The mission, in particular, must be unmistakably clear so that once the patrol is committed, all subordinate leaders can act with unity of purpose.

Whenever possible, the patrol leader should have a Seabee, such as the navigator, build a terrain model using dirt, sand, twigs, etc., explaining the concept of operations for movement to the objective area, actions at the objective area, and the return. Terrain models provide patrol members with a clear and simple layout of the area of operations and key terrain.

11.6.0 Supervise

Inspections and rehearsals—vital to proper preparation—are conducted even though the patrol leader and patrol members are well experienced in patrolling. Inspections determine the patrol's state of physical and mental readiness.

The patrol leader inspects before rehearsals to ensure completeness and correctness of uniform and equipment. The following areas are checked:

- Camouflage
- Identification tags, Geneva Convention cards

- Prescribed equipment, weapons, and ammunition available and serviceable
- Tape and other items used to “silence” equipment (prevent noise produced during movement)
- Items that could provide information to the enemy (e.g., letters and papers) remain behind
- Unnecessary equipment and excess weight remain behind

The patrol leader questions each patrol member to ensure the following is known:

- The mission, planned routes (primary and alternate), and the fire support plan of the patrol
- The individual’s role—what to do and when to do it
- What others are to do and how their actions impact the mission
- Challenges and passwords, codes, reporting times, radio call signs, frequencies, and any other pertinent details

There is usually a period of time between final rehearsal and departure. The patrol leader reinspects just before departure to ensure all equipment is still in working order and the unit is ready to embark on the mission.

Rehearsals ensure the operational proficiency of the patrol. Plans are checked and necessary changes are made. The patrol leader verifies the suitability of equipment. It is through rehearsals that patrol members become thoroughly familiar with actions to take during the patrol.

If the patrol will operate at night, both day and night rehearsals are conducted. Terrain similar to that over which the patrol will operate is used. All actions are rehearsed. If time is limited, the most critical phases are rehearsed. Action at the objective is the most critical phase of the patrol and is always rehearsed.

An effective method is to talk the patrol through each phase; describing the actions and having each member perform individual duties. When satisfied, the patrol leader walks the patrol through all phases of the plan using only the signals and commands to be used during the actual conduct of the patrol. Rehearsals continue until the patrol is thoroughly familiar with the plan. The rehearsal is also used to test the soundness of the patrol order and patrol organization.

After the rehearsal, the patrol leader makes final adjustments to the plan and patrol organization based on what was learned during the rehearsal and from other sources, such as adjacent patrols. When this is completed, the patrol leader issues final instructions to subordinate leaders noting any changes made in the patrol organization or plan. While the subordinate leaders are briefing the remainder of the patrol members, the patrol leader reports to the commander stating that the patrol is ready to begin the mission. The patrol leader also coordinates the location and time that the patrol can test fire all weapons prior to departure.

11.7.0 Execute the Mission

The successful completion of a patrol is the end result of the continuing efforts of every patrol member, who has earnestly applied knowledge, skills, and ingenuity to accomplish the mission.

Some of the principles to follow in the conduct of patrol and some of the techniques used are provided below. Remember, details vary with different circumstances.

11.7.1 Formation and Order of Movement

The elements of the patrol are established by its general organization. The formation in which the patrol moves forward and the location of elements in the formation are called Organization for Movement. An example of a reconnaissance patrol organization for movement is shown in *Figure 4-16, frame 1*. An example of a combat patrol organization for movement is shown in *Figure 4-16, frame 2*.

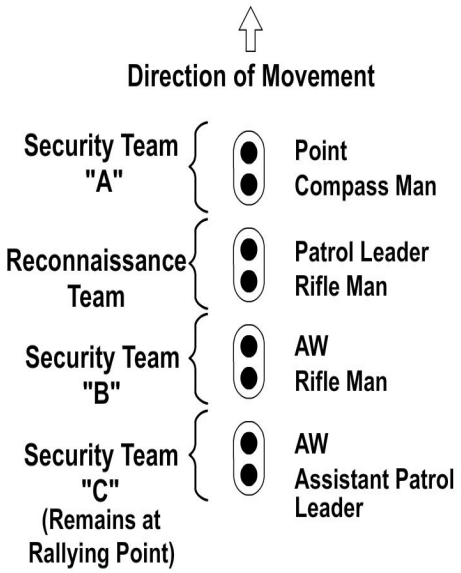


Figure 4-16 — Formation and order of movement.

11.7.2 Departure and Reentry of Friendly Areas

Move cautiously when approaching positions in friendly areas; it is possible to be regarded as an enemy until identified otherwise. The patrol leader should halt the patrol near the position; then go forward and contact the position and, if possible, the local Leader**.** The leader will take at least one team member or more if the situation permits, but remember that unusual activity at a forward position may attract enemy attention. The patrol leader tells personnel at the position the information they may need to assist the team, such as the size of the patrol, general route, and expected time of return.

Request the latest information on the enemy, the terrain to the front, and any known obstacles or dangers. Check for communication facilities, fire support, and other assistance they can provide. Check the challenge and password, and determine whether the same personnel will be manning the position when returning. If not, ask them to relay information about the patrol to their relief. If intended to be out longer than 1 day, obtain the challenge and passwords for each day out.

11.7.3 Rallying Points

A rallying point is a designated place where a patrol that has been dispersed can assemble and reorganize. It should provide cover, concealment, and be defensible for at least a short time. It must be easily recognizable and be known to all members of the patrol. Until a rallying point has been actually reached and found to be suitable, designate it as a Tentative Rallying Point. To designate a definite rallying point, the patrol leader halts the patrol upon arrival. Then announces, “This is a rallying point,” and points out the identifying features.

There are three Types of rallying points:

1. Initial rallying point. This is a point within the friendly area where the patrol can rally if it becomes scattered before leaving the friendly area or before reaching the first tentative rallying point outside the friendly area.

Interaction Available

2. En Route rallying point. This is a rallying point lying between the foremost friendly area and the objective.
3. Objective rallying point. This is a rallying point near the objective where the patrol assembles after accomplishing the mission.

The patrol leader must select and designate a tentative initial and objective rallying point before the patrol starts off. If these points prove suitable when they are reached, then they are confirmed by declaring them rallying points. Other points will be selected en route, as suitable positions are reached.

The following are general rules for the use of rallying points:

1. Select the initial and the en route rallying points to prevent complete disintegration of the patrol if it is unavoidably dispersed before reaching the objective.
2. The objective rallying point makes it possible for the patrol to reassemble after it has dispersed to carry out the objective.
3. If the patrol is dispersed in friendly areas, it reassembles at the initial rallying point.
4. If the patrol is dispersed between the initial rallying point and the first en route rallying point, it will assemble at one or the other of these points. The patrol leader must designate in the patrol order whether they desire reassembly at the initial rallying point or the first en route rallying point.
5. If the patrol is dispersed between en route rallying points, it will assemble either at the last rallying point or at the next (tentative) rallying point. Again, the patrol leader must designate which of these alternatives is desired. In this, and the former case, circumstances will control the decision.

11.7.4 Action on Enemy Contact

A patrol is subject to two types of enemy contact—Chance contact and Ambush.

In chance contact, meeting with the enemy is unexpected, and the enemy is not prepared.

In a chance contact, break contact as quickly as possible and continue the mission. Engaging the enemy longer than necessary could jeopardize the mission. The “clock” system is one way of breaking contact. The line of direction along which the patrol is moving is considered to be 12 o’clock. If the patrol leader called out “10 o’clock-200,” that would order the patrol to move off 200 yards in the 10 o’clock direction. The patrol must, as far as possible, keep the original formation.

Fire and Movement is another way of breaking a chance contact. One portion of the patrol returns enemy fire while another portion moves off. The two groups alternate covering fire and movement until both have broken contact.

In Ambush, the patrol is subjected to an intentional surprise attack by an enemy that is concealed and lying in wait.

In an ambush, the patrol may have the alternative of an assault in force to break through the ambush or a withdrawal like that used in a chance contact; however, a well-placed ambush usually prevents withdrawal by the flank. When the patrol must break through by assault, quickly determine the point of weakest enemy fire and assault this point with maximum firepower.

11.7.5 Action at Patrol Objectives

On a reconnaissance patrol, the patrol leader halts and conceals the patrol near the objectives; this is usually done at the objective rallying point. The patrol leader will then conduct a leader's reconnaissance to pinpoint the objective, then return to the patrol and position security teams according to the plan. The leader places these teams where they can best provide early warning of enemy approach and best cover the reconnaissance element, then scout the objective.

The patrol leader may be able to get the required information quickly and simply. Usually, the patrol leader must move to several positions, perhaps making a circle around the objective. In the event the leader must do this, the patrol leader instructs the assistant patrol leader to continue the mission if the leader does not return within a reasonable time. When reconnaissance is complete, the patrol leader assembles the patrol at the objective rallying point and tells everyone what was seen and heard. They have each person contribute anything significant that may have been seen or heard. A preliminary report is made by radio whenever possible; then return to the unit as quickly as possible to make a full report.

12.0.0 AMBUSH

An ambush is a surprise attack from a concealed position upon a moving or temporarily halted target. The ambush is one of the oldest and most effective military operations. Ambush may include assault to close with, and decisively engage, the target or the attack may be by fire only. Ambush is highly effective in conventional operations but is even more suitable and effective in guerrilla and counterguerrilla operations.

Ambush is a favorite tactic of guerrilla forces because it does not require that ground be seized and held. Also, it enables small forces with limited weapons and equipment to harass or destroy larger, better armed forces. An ambush is an effective counterguerrilla measure because it forces the guerrillas to engage in decisive combat at unfavorable times and places. An ambush denies the guerrillas the freedom of movement on which their success so greatly depends. It also derives the guerrillas of weapons, ammunition, and equipment that is difficult to replace; and the death or capture of "hard core" personnel greatly weakens the guerrilla force.

Ambushes are executed for the general purpose of reducing the overall combat effectiveness of the enemy and for the specific purposes of destruction and harassment. Destruction is the primary purpose because the loss of Seabees killed or captured and the loss of equipment and supplies destroyed or captured critically affects the enemy. The capture of equipment and supplies may assist our enemy forces.

Harassment is a secondary purpose. Though less apparent than physical damage, it is very important. Frequent ambushes force the enemy to divert forces from other missions to guard convoys, troop movements, and carrying parties. When patrols fail to accomplish their missions because they have been ambushed, the enemy is deprived of the valuable contributions these patrols would make to the combat effort. A series of successful ambushes causes the enemy to be less aggressive and more defensive. They become apprehensive, overly cautious, reluctant to go on patrols, to move in

convoys, or to move in small groups. After being ambushed, the enemy seeks to avoid night operations, is more subject to confusion and panic, and generally decline in effectiveness.

The two main types of ambush are point ambush and area ambush. A Point Ambush is one where forces are deployed to support the attack of a single killing zone. An Area Ambush is one where forces are deployed for multiple, related point ambushes.

In a deliberate ambush (an ambush planned as a specific action against a specific target), detailed information about the target is required: the size, nature, organization, armament, equipment, route of movement, and the times the target will reach or pass certain points on its route. There are two situations where deliberate ambushes should be planned. The first situation is when reliable information is received on intended movement of a specific force; the second is when patrols, convoys, carrying parties, or similar forces establish patterns of size, time, and movement sufficient to permit detailed planning for this ambush.

The ambush of a target of opportunity is often the action of a search and attack patrol. When available information does not permit the detailed planning required for deliberate ambush, an ambush of opportunity is planned. Then the ambush force plans and appeals. A search and attack patrol, before departing, plans and rehearses the ambush of the types of targets that may be encountered. This force establishes and executes ambushes as targets of opportunity arise.

12.1.0 Fundamentals of Successful Ambush

Surprise, coordinated fire, and control are the basic elements essential to a successful ambush.

Surprise must be achieved or the attack is not an ambush; surprise distinguishes ambush from other forms of attack. Also, surprise allows the ambush force to seize and retain control of the situation. When complete surprise cannot be achieved, it must be so nearly complete that the target is not aware of the ambush until too late for effective reaction. Surprise is achieved by careful planning, thorough preparation, and exact execution. Only through detailed planning and thorough preparation can a leader make a sound decision on when, where, and what type of targets should or should **NOT** be attacked and how to attack so the enemy is Least prepared.

All weapons, including mines and demolitions, must be positioned. All firepower, including that of available artillery, must be coordinated to achieve the isolation of the killing zone to prevent escape or reinforcement. An ambush must also achieve the surprise delivery of a large volume of highly concentrated fire into the killing zone. The fire must inflict maximum damage so, when desired, the team can speedily assault and completely destroy the target.

Close control must be maintained during movement to, occupation of, and withdrawal from the ambush site. The ambush commander must effectively control all elements of the ambush force. Control is most critical at the time of approach of the target. Control measures must provide for the following:

1. Early warning of target approach
2. Withholding of fire until the target has moved into the killing zone
3. Opening fire at the proper time
4. Initiation of the right actions if the ambush is prematurely detected

5. Lifting or shifting of supporting fires when the attack includes assault of the target
6. Timely and orderly withdrawal of the ambush force to an easily recognizable rally point

The ambush force must maintain maximum control over them so they do not compromise the ambush. They must use patience and self-discipline by remaining still and quiet while waiting for the target to appear. They may have to endure insect bites, to thirst in silence, to resist the desire to sleep, to ease cramped muscles, and to perform normal body functions. When the target approaches, the team must resist the temptation to open fire before the signal is given.

12.2.0 Point Ambush

A point ambush can be used independently or as part of an area ambush. In a point ambush, the attack force is positioned along the target's expected route of approach. The formation is an important consideration because it determines whether a point ambush is able to deliver the heavy volume of highly concentrated fire necessary to isolate, trap, and destroy the target.

The formation is determined by careful consideration of possible formations and the advantages and disadvantages of each in relation to the following:

1. The terrain, conditions of visibility, forces, weapons, and equipment
2. The ease of difficulty of control, and the target to be attacked
3. The overall combat situation

In this training manual, a few formations that have been developed for the deployment of point ambushes are discussed. Those discussed are identified by giving them names that correspond to the general pattern formed on the ground by the deployment of the attack force.

12.2.1 Line

The attack force of the Line ambush (*Figure 4-17*) is deployed generally parallel to the target's route of movement (road, trail, stream, etc.) This positions the attack force parallel to the long axis of the killing zone and subjects the target to heavy flanking fire. The area that the attack force can effectively cover with a heavy volume of highly concentrated fire limits the size of the killing zone that can trap the target. The target is trapped in the killing zone by natural obstacles, mines (Claymore, antivehicular, and antipersonnel), demolitions, and direct and indirect fire.

A disadvantage of the line formation is the chance that lateral dispersion of the target may be too great for effective coverage. The line formation is appropriate in close terrain that restricts target maneuvers and in open terrain where one flank is restricted by natural obstacles or can be restricted by mines, demolitions, man-traps, or stakes. Similar obstacles can be placed between the attack force and the killing zone to provide protection from the target's counterambush measures. When a destruction ambush is deployed in this manner, access lines are left so the target can be assaulted. An advantage of the line formation is its relative ease of control under all conditions of visibility.

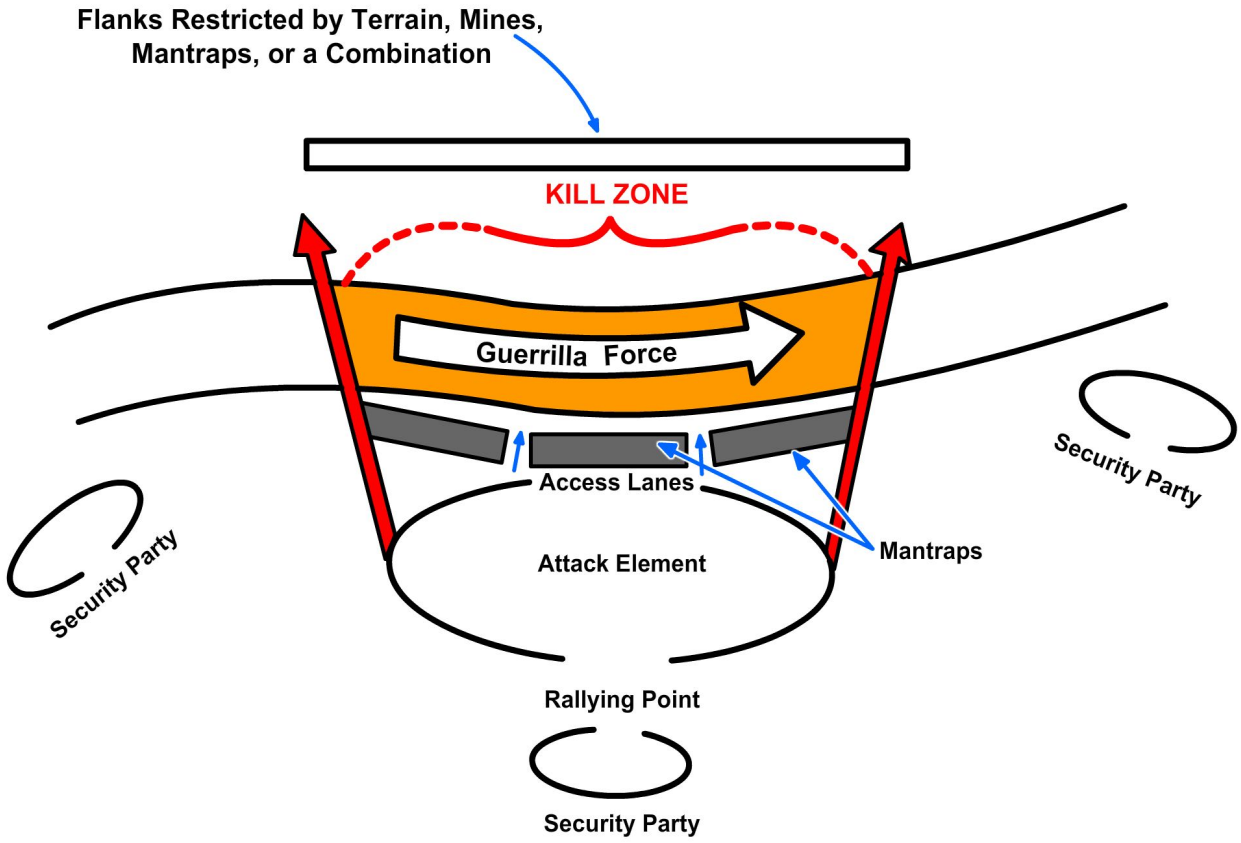
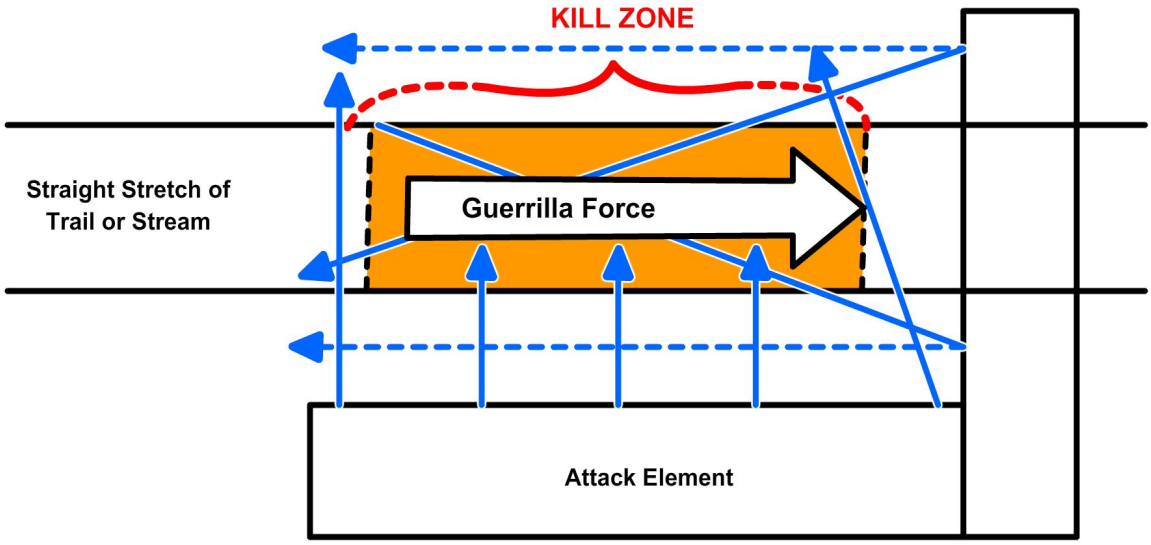


Figure 4-17 — Line ambush.

12.2.2 The L

The L-shaped formation is a variation of the line formation. The long side of the attack force is parallel to the killing zone and delivers flanking fire. The short side of the attack force is at the end of, and at right angles to, the killing zone and delivers enfilading fire that interlocks with fire from the other leg as shown in *Figure 4-18, frame 1*. This formation is very flexible. It can be established on a straight stretch of a trail, stream, or at a sharp bend in a trail or stream (*Figure 4-18, frame 2*). When appropriate, fire from the short leg can be shifted to parallel the long leg if the target attempts to assault or escape in the opposite direction. In addition, the short leg prevents escape in its direction and adds reinforcement from its direction.



Destruction Ambush

Figure 4-18 — The "L" ambush.

Interaction Available

12.2.3 The Z

The Z-shaped formation (*Figure 4-19*) is another variation of the line formation. The attack force is deployed as in the L formation, but with an additional side so the formation resembles the letter Z. The additional side may serve any of the following purposes:

- To engage a force attempting to relieve or reinforce the target
- To seal the end of the killing zone
- To restrict a flank
- To prevent envelopment

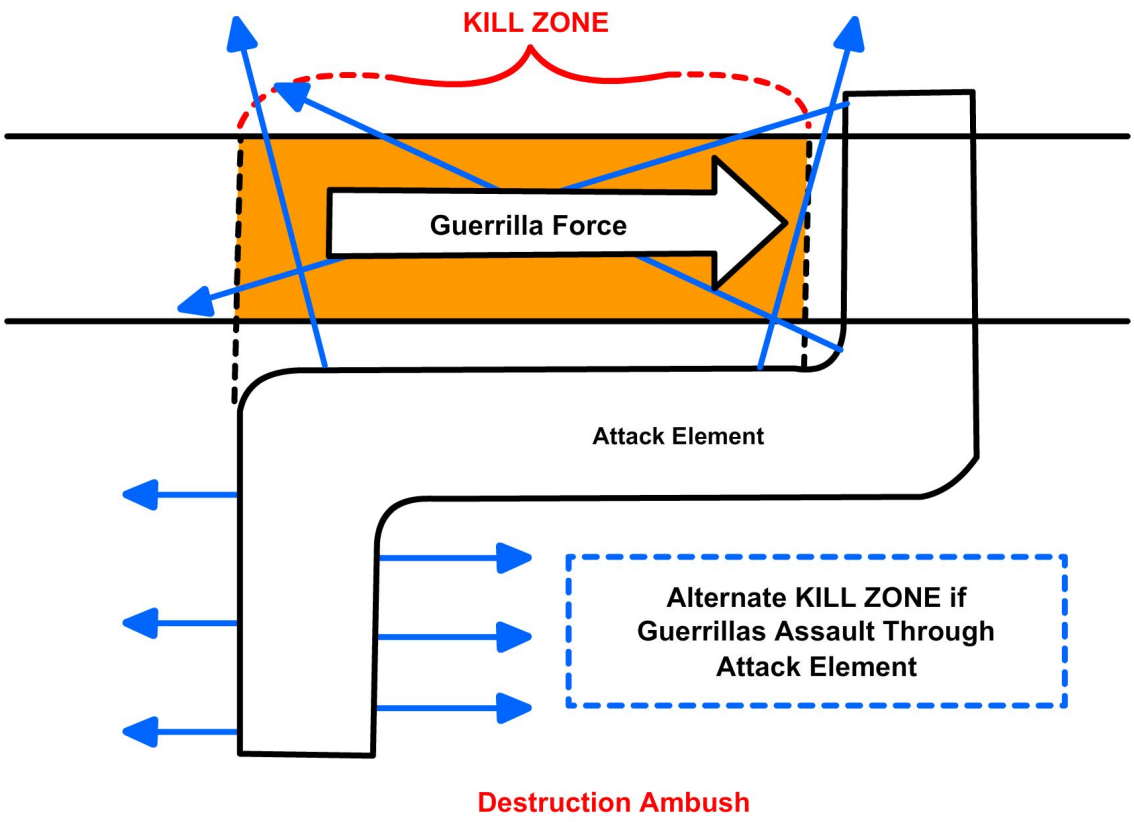


Figure 4-19 — The "Z" ambush.

12.2.4 The T

In the T-shaped formation (*Figure 4-20*), the attack force is deployed across and at right angles to the target's route of movement so the attack force and the target form the letter T. This formation can be used day or night to establish a purely harassing ambush. At night it can be used to establish an ambush to stop or hamper enemy movement through open, hard-to-seal areas, such as rice paddies.

A small force can use the T formation to harass, slow, and disorganize a larger force. When the lead elements of the target are engaged, they normally attempt to maneuver right or left to close the ambush. Mines, traps, and other obstacles placed to the flanks of the killing zone slow the movements of the enemy. They also permit the ambush force to deliver heavy fire and withdraw without becoming decisively engaged. An ambush established and executed in this manner is called a "bloody nose" ambush.

The T formation can be used to stop or hamper small groups attempting night movement across open areas; for example, deploy the attack force along a rice paddy dike with every other Seabee facing in the opposite direction. The attack of a target approaching from either direction requires only that every other Seabee shift to the opposite side of the dike. Each Seabee fires only to the front and only when the target is at very close range. Attack is by fire only and each Seabee keeps the target under fire as long as it remains on the front. When the target attempts to escape in either direction along the dike, each Seabee takes it under fire as it comes to their vicinity. The T formation is very effective at halting infiltration. However, it has one chief disadvantage—there is a possibility that the ambush will engage a superior force at night while spread out; therefore, use of this formation must fit the local enemy situation.

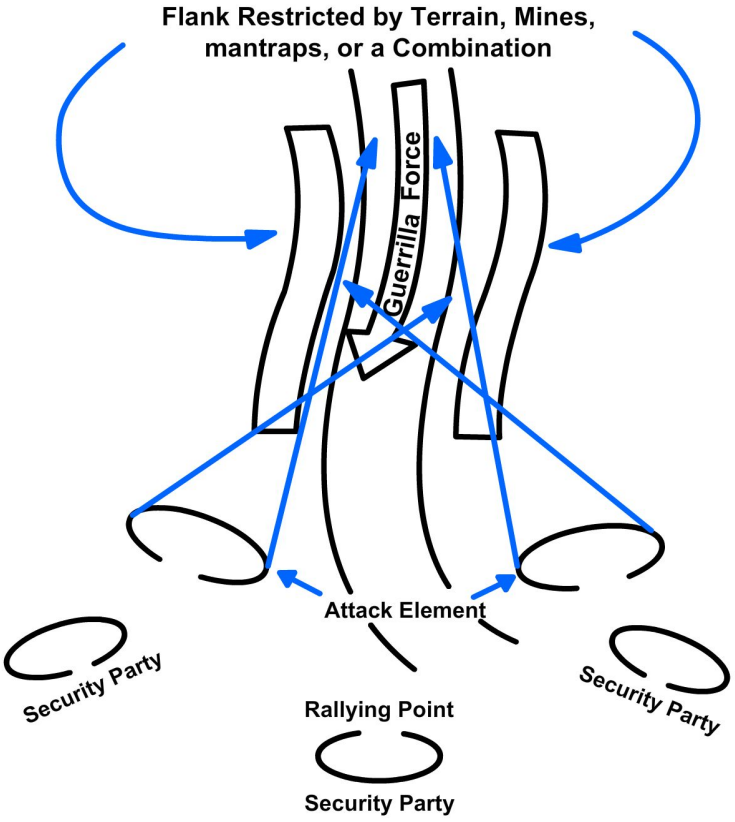


Figure 4-20 — The "T" ambush.

12.2.5 The V

Deploy the V-shaped attack force along both sides of the target's route of movement so it forms the letter V as shown in *Figure 4-21*. Care is taken to ensure that neither group nor leg fires into the other. This formation subjects the target to both enfilading and interlocking fire. The V formation is best suited for fairly open terrain but can also be used in the jungle. When established in the jungle, the legs of the V close in as the head elements of the target approach the apex of the V and open fire from close range. Here,

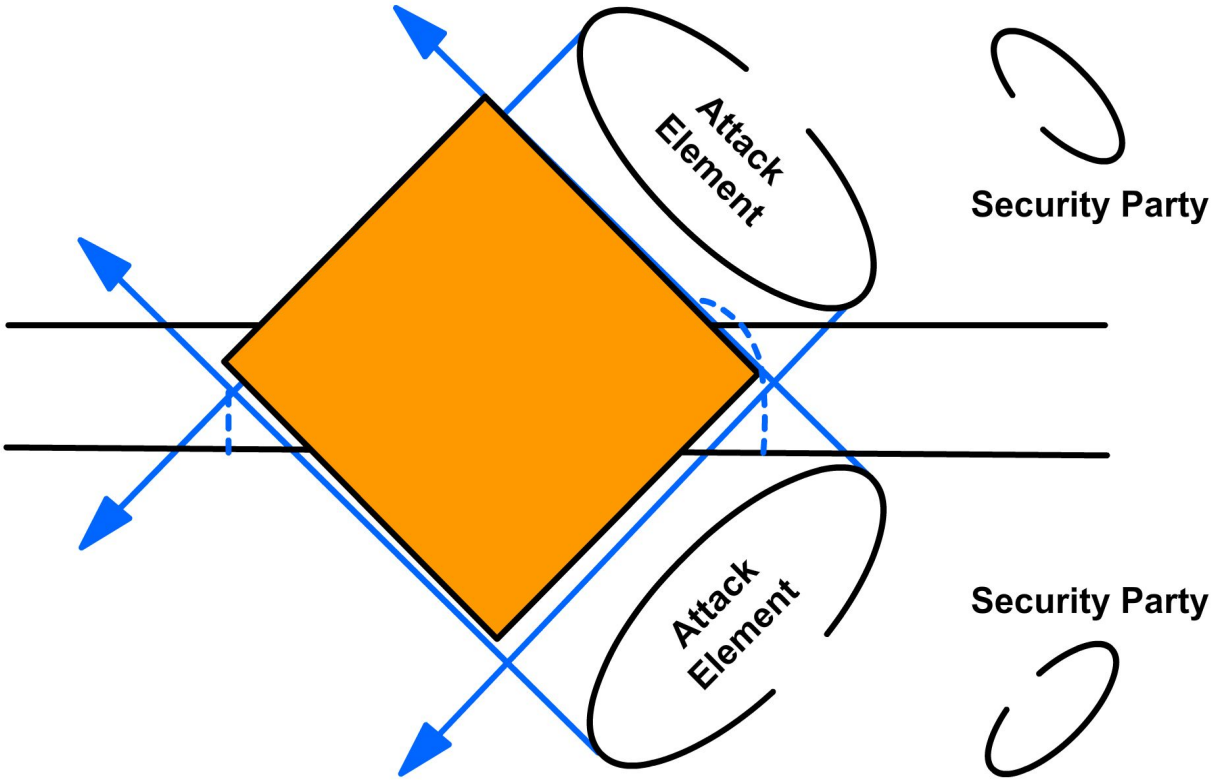


Figure 4-21 — The "V" ambush.

even more than in open terrain, all movement and fire must be carefully coordinated and controlled to ensure that the fire of one leg does not endanger the other. The wider separation of forces makes this formation difficult to control, and there are fewer sites that favor its use. The main advantage of the V formation is the target has difficulty detecting the ambush until the ambush force is well into the killing zone.

12.3.0 Counterambush Drills

When a patrol is ambushed, the immediate action drill to use is determined by whether the ambush is near or far.

In a Near ambush, the killing zone is under heavy, highly concentrated, close-range fire. There is little time or space for warriors to maneuver or seek cover. The longer they remain in the killing zone, the more certain their destruction; therefore, if attacked by a Near ambush, the patrol should react as follows:

1. Seabees in the killing zone, Without Order or Signal**,** immediately assault directly into the ambush position, occupy it, and continue the attack or break contact as directed. This action moves them out of the killing zone, prevents other elements of the ambush from firing on them without firing on their own men, and provides positions from which other actions may be taken.
2. Seabees not in the killing zone must maneuver against the attack force and other elements of the ambush as directed.
3. To eliminate the ambush or to break contact, the men continue the attack as directed.

In a FAR ambush, the killing zone is also under heavy, highly concentrated fire but from a greater range. This greater range provides Seabees in the killing zone some space to maneuver and an opportunity to seek cover at lesser risk; therefore, if attacked by a far ambush, the patrol should react as follows:

1. Seabees in the killing zone, Without Order or Signal, immediately return fire. They should take the best position available and continue firing until directed otherwise.
2. Seabees not in the killing zone must maneuver against the ambush force as directed.
3. To eliminate the ambush or to break contact, the men should continue the attack as directed.

In each situation, the success of the counterambush drill used is dependent on the Seabees being well trained in recognizing the nature of an ambush and well rehearsed in the proper reaction.

Summary

In this chapter you learned about the dangers of conducting a patrol under wartime conditions. By now you have realized that being a Seabee is a dangerous job. Not just because of the hazards of the construction zone, but the hazards of war. You have learned how to plan, set up, and conduct a patrol. You learned how to move silently through the night. The importances of combat formations were discussed with samples of what they look like. Remember that if a Seabee does not know the signals or how to perform the patrols, the unit could be in danger and the survival of the team depends on each member knowing their job.

Assignment 4

Objectives

1. Specify methods of moving individuals and formations in a combat area and conditions under which individual methods should be used.
2. Indicate actions to be taken by an individual when caught in the light of an overhead or ground flare.
3. Differentiate between types of fire team formations relative to purpose, use, and their limitations under given combat conditions; specify the duties of the fire team leader assigned to basic fire team formations and movements.
4. Specify the kinds of rifle squad formations used in given combat situations and how squad formations are changed to meet changing tactical situations.
5. Specify the kinds of rifle platoon formations used under given combat conditions.
6. Specify the purpose and use of the weapons unit formation during an attack.
7. Describe a patrol in terms of its objective and orders.
8. Define the duties and positions of patrol personnel and techniques of control, security, and movement.
9. Define the duties and positions of patrol personnel and techniques of control, security, and movement.
10. Point out principles and techniques of ambush.

Questions

1. While in enemy controlled terrain, what is the ideal method of moving by foot?

    1. short distances quickly
    2. slowly and deliberately
    3. in a zigzag pattern
    4. long distances quickly

2. When crossing roads, trails, and rivers in a combat zone, you should cross at what location?

    1. An area with the most cover and concealment
    2. A culvert large enough to crawl through
    3. A low spot to help avoid detection
    4. A curve to cut down on the distance you can be seen

3. While armed with an M16 rifle, what action should you take when hitting the dirt or deck?

    1. Slide your hand to the heel of the butt
    2. Hold the rifle in one hand and break your fall with the other
    3. Be sure to break your fall with the rifle butt
    4. Grip the rifle by the sling near the sling swivel

4. While conducting the low crawl with an M16 rifle, what is the preferred method of carry?

    1. Cradle it in your arms
    2. Grip it by the sling near the butt and pull it with the muzzle to the rear
    3. Grip it by the sling near the upper sling swivel and let the balance rest in your forearm
    4. Grip it by the muzzle and let the butt drag along the ground

5. When on a night patrol near an enemy encampment, what is the required method of moving?

    1. Rush
    2. Low crawl
    3. High crawl
    4. Walk silently

6. From a standing position, you are trying to assume the prone position silently. With one hand, you first feel the ground and clear it of noisemaking objects. What is your next step?

    1. Lower both knees to the ground at the same time until they support the weight of your body
    2. Lower your knees to the ground one at a time until your weight is supported by one hand and both knees
    3. Lower both knees while falling forward on your stomach
    4. Lower both knees while falling forward on your right or left elbow

7. If you are caught in the open when an overhead flare goes off, What action should you take?

    1. Crouch low and remain motionless until the flare burns out
    2. Immediately hit the dirt or deck until the flare burns out
    3. Move out of the lighted area as quickly and quietly as possible
    4. Silently get in the prone position as fast as possible

8. When caught by an overhead flare, what situation requires you to crouch as low as possible and remain motionless?

    1. When crossing barbed wire
    2. When caught in an open field
    3. When crossing a stream
    4. When assaulting an enemy position

9. When, if ever, must the squad leader have each individual maintain exact distances between individuals and units that are in combat formations?

    1. When the formations are under heavy enemy fire
    2. When the squad leader cannot maintain control in another way
    3. When the squad leader is using hand-and-arm signals to communicate
    4. Never

10. In a basic fire team formation, at what position should the fire team leader be placed?

    1. Between rifleman No. 1 and rifleman No. 2
    2. Where the fire team leader can best observe the fire team
    3. Where the fire team leader can best be protected by the fire team
    4. In the foremost position

11. The automatic rifleman is positioned within the basic fire team formation to ensure that the automatic rifleman can perform what function?

    1. Direct rifleman No. 1
    2. Receive ammunition from rifleman No. 2
    3. Provide security for the fire team
    4. Quickly deliver fire to each flank

12. In a fire-team column formation, the firepower is limited in what direction?

    1. Front
    2. Right flank
    3. Left flank
    4. Rear

13. In regard to firepower, an echelon-right formation provides

    1. maximum firepower to the front
    2. all-around security
    3. minimum firepower to the right and to the front
    4. maximum firepower to the front and maximum to the right

14. If you are assigned as fire team leader, what factors will control the type of fire-team formation you use?

    1. Visibility and types of weapons
    2. Ease of control and speed
    3. Enemy firepower and ease of control
    4. Terrain features and tactical situations

15. When a unit is moving in the fog or through the woods, the squad column should be used because it provides what benefits?

    1. Good control and maneuverability
    2. Security to the front and both flanks
    3. Maximum firepower to the front
    4. Protection to exposed flanks

16. What squad members should be used as the pivot during squad formation changes?

    1. Senior rifle unit
    2. First fire team
    3. Second fire team
    4. Third fire team

17. When the enemy's position is to the front and to the left of you, what type of platoon formation should you use to direct maximum firepower at the enemy?

    1. Line
    2. Skirmishers left
    3. Echelon left
    4. Wedge

18. How many different elements are there in a rifle company's attack formation?

    1. Six
    2. Two
    3. Three
    4. Five

19. What element of a rifle company is assigned the task of taking an assigned objective?

    1. The main attacking force
    2. The supporting attack force
    3. The squad
    4. The fire team

20. What is the main objective of most Seabee patrols?

    1. Static defense
    2. Delaying the enemy
    3. Security patrolling
    4. Aggressive patrolling

21. As the leader of a reconnaissance patrol, what is the only reason to engage the enemy?

    1. Destroy an enemy patrol
    2. Accomplish your mission
    3. Delay an enemy attack
    4. Confuse an enemy attack

22. A patrol order should contain the time of departure, time of return, general route and what other type of information?

    1. Communication plan
    2. Food plan
    3. Weapons inventory
    4. Patrol chain of command

23. Where in a patrol should the patrol leader be positioned?

    1. At the head of the patrol
    2. Where best control of the patrol is accomplished
    3. Where the most protection is provided by the patrol
    4. At the rear of the patrol

24. When you are the patrol leader and the route takes you near an enemy position, how should you issue orders to control the patrol?

    1. By halting the patrol and giving each man his orders one at a time
    2. By giving hand-and-arm signals only while on the move
    3. By using sound signals only while on the move
    4. By assembling the patrol and passing the word orally to the assembly

25. The point position in a patrol has the responsibility to investigate what position?

    1. The area to both sides of the route of march only
    2. The area directly in front of the patrol only
    3. The rallying points before the patrol arrives
    4. The front and sides of the route of march

26. What series of preplanned objectives regulates the progress of the patrol toward its final objective?

    1. Intermediate
    2. Primary
    3. Secondary
    4. Alternate

27. When you are on a patrol that has been ambushed and the patrol is forced to separate, you should immediately proceed to what location?

    1. Primary objective
    2. Closest alternate objective
    3. Closest rallying point
    4. Intermediate objective

28. When you plan a patrol, what factor governs the operation?

    1. Personnel
    2. Mission
    3. Time
    4. Weapons

29. After a mission has been studied and its tasks identified, what factors must be considered to execute the mission?

    1. Objective
    2. Time
    3. Enemy position
    4. Personnel

30. What factors affect the size of a patrol, its route, and the types of weapons and equipment it will carry?

    1. Terrain features, cover, and concealment
    2. Troop disposition, strength, and capabilities
    3. Time left before departure of the patrol
    4. Distance the patrol must cover

31. Each of your patrol members should carry a poncho, a pair of gloves, and an extra pair of socks in addition to the uniform and web equipment the patrol member is wearing. All of this gear is classified as what type of equipment?

    1. Enroute
    2. Control
    3. Objective
    4. Routine

32. What format is used for the patrol's mission, general instructions, and a short briefing of the situation given to its members?

    1. The patrol order
    2. The warning order
    3. The complete detailed plan
    4. The patrol leaders' order

33. If your patrol requires fire support to divert the enemy's attention while you are leaving friendly lines, what patrol planning step is used?

    1. Execute the mission
    2. Organize the patrol
    3. Coordinate
    4. Planning

34. When it is not possible to make an aerial reconnaissance while your patrol is preparing for a mission, you should try to obtain the required information in what way?

    1. By enlarging area maps
    2. By studying aerial photographs
    3. By observing from a vantage point
    4. By asking indigenous personnel about the area

35. Before issuing orders, what action should the patrol leader take?

1. Inspect men and equipment
2. Describe the plan orally
3. Rehearse the mission by day and by night
4. Announce departure and return times only

36. Even though time is limited; a patrol must always rehearse its actions. Where is the best place to conduct this rehearsal?

1. At the point where the patrol will leave friendly lines
2. At the point where the patrol will return to friendly lines
3. At the objective area
4. At the site where the patrol is likely to be ambushed

37. A patrol's formation in combat or on a reconnaissance mission en route to an objective is known as its _____.

1. general organization
2. conduct during the patrol
3. organization for movement
4. coordination for the patrol

38. When a patrol departs friendly lines and plans to be out two days, what information must be obtained by the patrol leader?

1. Challenge for the second day only
2. Password for the second day only
3. Passwords and challenges for both days
4. Codewords and authentication keys for both days

39. When making up the patrol plan, rallying points that the patrol leader selects are known as?

1. tentative
2. objective
3. initial
4. en route

40. During a patrol, you come upon the enemy unexpectedly and a fire fight occurs. Which of the following actions should you take?

1. Attack the enemy at their weakest point
2. Break contact as soon as possible and continue the mission
3. Disperse and regroup at the designated rallying point
4. Direct maximum firepower at the enemy until they retreat

41. If caught in an enemy ambush where withdrawal appears impossible, a patrol should be ordered to?

A. surrender
B. break contact by firepower and movement
C. break contact by movement to the right
D. assault the weakest point with maximum firepower

42. What is the primary purpose of an ambush?

1. To harass the enemy
2. To confuse and panic the enemy
3. To divert enemy troops from other missions
4. To destroy enemy personnel and equipment

43. When against a small enemy force that requires you to create only one killing zone, what type of ambush should succeed?

1. Area
2. Deliberate
3. Opportunity
4. Point

44. You are on a patrol sent into enemy territory to destroy small enemy units. You have no definite information about the enemy, so you must ambush the first suitable target. This is an example of what type of ambush?

1. Opportunity
2. General purpose
3. Deliberate
4. Clandestine

45. Although you must always maintain close control of your team at an ambush site, this control is most important at which of the following times?

1. During the ambush
2. When the target is approaching
3. When withdrawing from the ambush site
4. When arriving at the ambush site

46. The formation of a point ambush mainly determines whether or not a point ambush can …….

1. Deliver the coordinated volume of fire required.
2. Achieve the surprise necessary to trap the enemy.
3. Achieve a timely and orderly withdrawal.
4. Approach the target area without detection.

47. In what terrain is the line formation of a point ambush effective?

1. In open terrain where one flank is restricted
2. In open terrain where both flanks are accessible
3. In terrain where lateral dispersion of the enemy is possible
4. In close terrain where both flanks are accessible

48. The short side of an L-formation should be deployed in what area?

1. On the opposite side of the enemy's route of march
2. Parallel to the enemy's route march
3. Across the enemy's route of march
4. At the end of and at right angles to the killing zone

49. Which of the following types of ambush formations may be used strictly as a harassing ambush?

1. Line
2. L
3. T
4. V

50. What is the main advantage of using the V-ambush formation?

1. It is easy to control
2. It is hard for one leg of the V to fire into the other leg
3. It is difficult to detect until the enemy is well into the killing zone
4. It subjects the enemy to both enfilading and interlocking fire

51. When caught in the killing zone of a near ambush, a patrol should react by?

1. assaulting the enemy when ordered by the patrol leader
2. returning fire and taking cover as ordered by the patrol leader
3. returning fire and taking cover without orders from the patrol leader
4. assaulting the enemy position without orders from the patrol leader

52. An assault on a near enemy ambush should continue until the patrol is able to?

1. reach suitable cover and eliminate return fire
2. make a breach in the ambush so contact can be broken
3. get room in which to maneuver
4. eliminate the ambush or break contact as directed

53. Whether a patrol succeeds or fails in breaking out of an enemy ambush depends mainly on the?

1. purpose of the ambush
2. extent to which the patrol is trained and rehearsed
3. type of ambush formation the enemy is using
4. number of enemy weapons being used against you

ASSIGNMENT 4

Combat Maneuvers, Formations, Patrols, and Ambushes

Directions: Select the correct answer from the list of alternates below each question in the end of chapter assignment. Write in the answer next to the corresponding question number below. Use this answer sheet as a reference to completing the online assignment related to this assignment.

1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	
12.	
13.	
14.	
15.	
16.	
17.	
18.	

19.	
20.	
21.	
22.	
23.	
24.	
25.	
26.	
27.	
28.	
29.	
30.	
31.	
32.	
33.	
34.	
35.	
36.	

37.	
38.	
39.	
40.	
41.	
42.	
43.	
44.	
45.	
46.	
47.	
48.	
49.	
50.	
51.	
52.	
53.	

Additional Resources and References

This chapter is intended to present thorough resources for task training. The following reference works are suggested for further study. This is optional material for continued education rather than for task training.

Scouting and Patroling, Marine Corps Warfighting Publication (MCWP) 3-11.3

Commander's Tactical Handbook, Marine Corps Reference Publication (MCRP) 3-11.1A

Marine Rifle Squad, Marine Corps Warfighting Publication (MCWP) 3-11.2

Trainee Feedback

Center for Seabees and Facilities Engineering (CSFE) makes every effort to keep their courses up-to-date and free of technical errors. If you have a suggestion, found an error or inaccuracy, please write, FAX or email us by using the form below. Use one form for each comment and be sure to fill in the information as accurately and detailed as possible. Thank you for your assistance.

Write: CSFE
NCF Training Division (N7B)
3502 Goodspeed St.
Port Hueneme, CA 93043-4337

FAX: (805) 982-5508 / DSN 551-5508

E-mail: CSFE_CBCH@navy.mil

Trainee Feedback Form

Course: Seabee Combat Handbook, Volume ____, NAVEDTRA: _____

Course Date: _____ Chapter Number: _____ Page: _____

Paragraph: _____ Sentence: _____ Figure: _____ Frame/View: _____

Description: _____
_____
_____
_____
_____
_____

(optional) Corrective action: _____
_____
_____

(optional) Supporting reference(s): _____
_____

Your email address, if a response is requested: _____

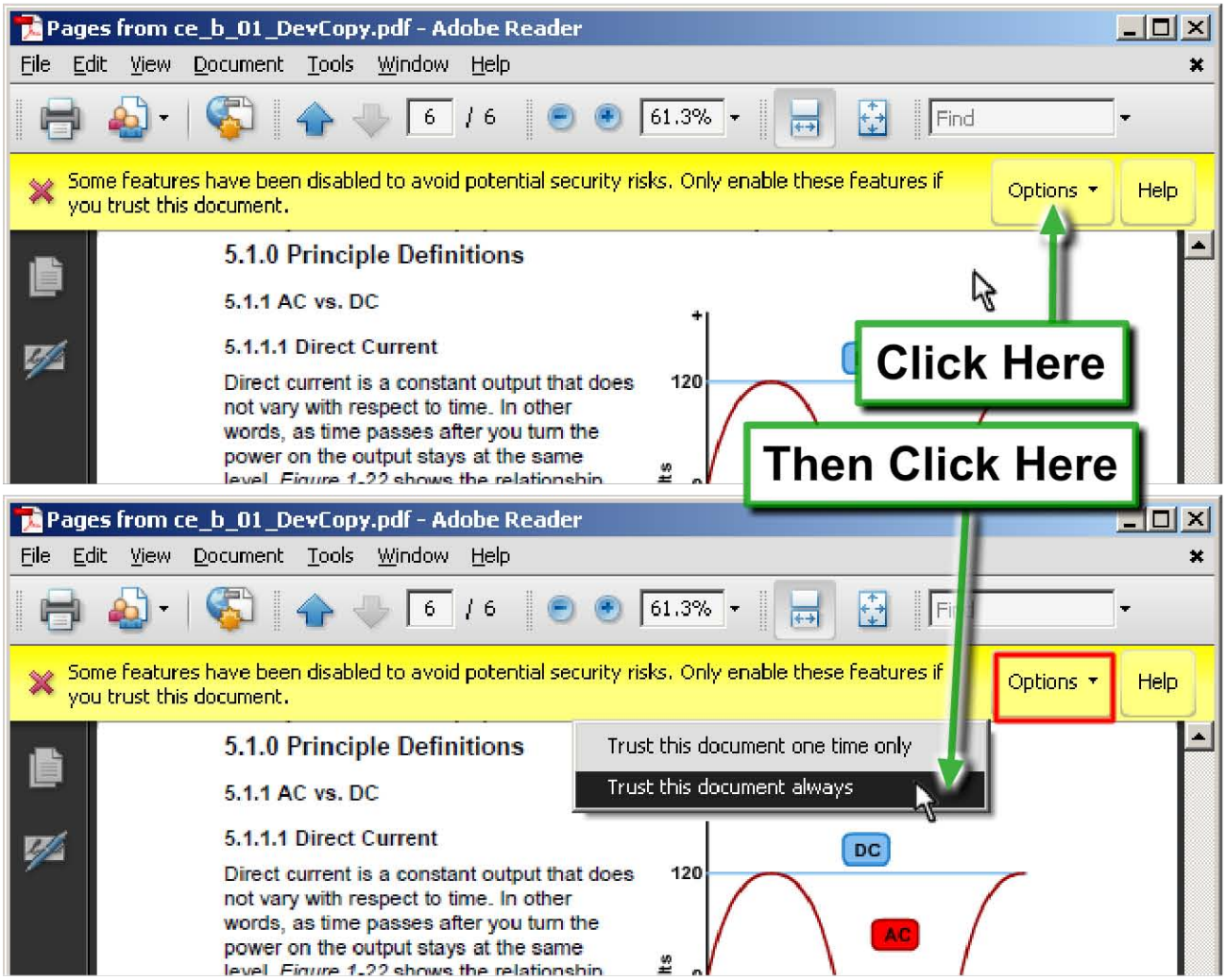
The Interactive features of this manual are currently disabled.

Many graphics will not appear correctly unless these features are turned on. You should either see a popup window, or a yellow banner at the top of the application. To enable the Interactive features of this manual follow the steps illustrated below:

If you see a popup window do the following:



If you see a yellow banner, do the following:



Once you have completed either of the above procedures the features will be enabled for this document, and this warning won't appear again after you leave this page.

Chapter 5

Land Navigation

Topics

1.0.0 Terrain Appreciation

2.0.0 Components of Terrain

3.0.0 Military Aspects of Terrain

4.0.0 Maps and the Compass

5.0.0 Navigation Equipment and Methods

6.0.0 Sketches and Overlays

To hear audio, click on the icon: 

Overview

Usually, the terrain dictates troop movements and formations, positions to be defended, and locations for weapons placement. You cannot memorize definite rules to cover every situation. However, there are certain principles discussed in this chapter that, when applied intelligently, will result in sound solutions or decisions. Knowledge of these principles is not enough to give you the advantage. You must know the terrain intimately to use it properly. Other than making a personal reconnaissance of the terrain, you must be thoroughly familiar with the use of commercially prepared maps as well as maps drawn hastily in the field. You must also interpret signs and symbols used on maps, prepare field sketches and overlays, and learn to use the lensatic compass properly.

Terrain is another name for a piece of ground. For our purposes, it is a region or territory viewed for its suitability as a battleground. How you make use of the terrain, its texture—even its color at different times of the day, will affect everything you and the enemy do or can do. Both you and the enemy have the terrain of the battlefield in common. More often than not, victory goes to whoever understands and uses the terrain best.

Objectives

When you have completed this chapter, you will be able to:

1. Describe the principles of terrain appreciation.
2. Explain the aspects of weather, climate, and seasons as they influence the terrain.
3. Identify those qualities known as the military aspects of terrain that can be used by each unit leader in the employment of their forces and weapons.
4. Locate a point on a map when given the references.
5. Locate an object on a map utilizing the grid system.

6. Determine how contour lines are used for indicating elevation and relief on military maps.
7. Describe how direction and base lines are used in the preparation of military maps.
8. Identify topographic and military features represented on military maps as symbols.
9. Describe the components and the use of the lensatic compass, in relation to determining an azimuth, back azimuth, intersections, and resections.
10. Identify steps in drawing sketches and describe ways to properly register a map overlay.

Prerequisites

There are no prerequisites for completing this manual.

Features of this Manual

This manual has several features which make it easy to use online.

- Figure and table numbers are italicized within the handbook text. Figure and table reference numbers are conveniently located next to (or near) the applicable handbook text.
- Audio and video clips are included in the text, with italicized instructions telling you where to click to activate the appropriate link.
- Review questions are included at the end of this chapter as the chapter assignment. To submit assignments log into https://www.courses.netc.navy.mil, go to “Student Services”, in the drop down click on “Active Courses”, go to "View/Submit Answers" next to the course you wish to submit answers for. Assignments may be submitted to the above Web site as they are completed, and instant scoring is available. Your completion letter is available as soon as you pass all assignments.
- A form at the end of each chapter allows your input for improving the manual or correcting errors to be brought to the attention of CSFE’s Technical Review Committee. Your input is important and will help keep this manual up to date and free of technical errors.

1.0.0 TERRAIN APPRECIATION

Terrain appreciation is the analysis of an area to determine the effect that the terrain features have on probable military operations by either of the opposing forces. Terrain can be viewed with either offensive or defensive intentions in mind. However, regardless of the type of mission, each Seabee leader must evaluate the terrain offensively and defensively. Then the Seabee leader can anticipate the enemy's analysis of the situation. Information on the terrain may be acquired through various sources, but a physical reconnaissance of the area is the most important and reliable method of obtaining accurate information. When a physical reconnaissance is not possible or additional information is desired, it may be obtained by one or more of the following sources:

1. Aerial reconnaissance and photographs
2. Maps of the area
3. Terrain models provided by higher authority
4. Intelligence reports
5. Patrols
6. Friendly natives, undercover agents, or captured enemy prisoners

2.0.0 COMPONENTS OF TERRAIN

In military terminology, terrain is simply the ground over which we intend or propose to fight. In the military, the word terrain is an all-inclusive term, referring not only to the ground itself, but also to all other conditions that influence the ability of the combatant to carry out an assigned mission. For the sake of simplicity, terrain has two major aspects. The first is weather, climate, and season; the second is topography.

2.1.0 Weather Climate and Season

Weather is the day-to-day changes in atmospheric conditions. Climate is the average weather over an extended period of time. Seasons are characterized by particular conditions of weather, such as summer and winter in the United States or the rainy and dry seasons in Southeast Asia. Of these three elements, weather is the most important consideration from a tactical viewpoint. For long-range planning or in the absence of weather information, climatological and seasonal data may be used to estimate weather conditions.

2.1.1 The Elements of Weather

Weather consists of several atmospheric elements, each affecting tactics in its own way. These elements are as follows:

1. TEMPERATURE. This is the degree of hotness or coldness in a geographic area.
2. HUMIDITY. This is the percentage of water vapor in the air.
3. VISIBILITY. This is the ability to see both horizontally and vertically. It is influenced by fog, haze, heat refraction, clouds, or precipitation.
4. PRECIPITATION. This is the depositing of moisture (rain, mist, snow, sleet, hail) from the atmosphere upon the surface of the earth expressed in kind and amount.

5. WIND. This is the movement of air within the atmosphere. It is expressed as strength (velocity) and direction.
6. PHASES OF THE MOON. The moon has several phases; the most commonly named are New Moon, First Quarter, Full Moon, and Last Quarter. The phases have a direct bearing on night visibility and the amount of rise and fall of the tides.

2.1.2 The Effect of Weather on Tactics

Weather has a direct effect on the visibility, movement, use, and effect of weapons. Horizontal visibility may be materially reduced (resulting in reducing the observation of the enemy or the effect of offensive fire) by fog, haze, heat refraction, or precipitation. Vertical visibility may be restricted by fog, precipitation, or a large mass of low-lying clouds, thus reducing the effectiveness of air support or aerial reconnaissance.

Ease of movement, both logistical and tactical, on roads or cross-country may vary drastically from day to day because of precipitation and temperature changes. A heavy rain may change a passable area into an impassable quagmire; but a severe temperature drop may cause the same quagmire to freeze, thus aiding movement.

Weather affects weapons, both in employment and in the effectiveness of the weapon itself. The trajectory of artillery and mortar rounds is greatly influenced by temperature and humidity. Extreme cold and hot weather require special treatment and handling of gasoline engines, thus affecting the use of equipment and vehicles. The effects of weather are particularly noticeable in air and naval weapon systems support. Air support may be restricted or prevented entirely by clouds, fog, or heavy precipitation. Fog, snow, or heavy rainfall reduces visibility; therefore, naval gunfire support cannot be delivered as effectively, and new targets cannot be rapidly located and engaged.

2.2.0 Topography

Topography consists of the physical aspects of the surface of the earth and includes such features as relief and drainage, vegetation, surface materials, and cultural features.

2.2.1 Relief and Drainage

Relief is the term given to the differing areas of elevation and depression on the surface of the earth. Drainage refers to those areas of surface depression that serve as water runoffs or collection points, such as marshes, swamps, streams, rivers, ponds, and lakes. Knowledge of the general shape of the land is gained through a detailed study of the Relief and Drainage features. The steepness of slopes; the height and size of hill masses; the depth, width, and length of drainage features; and the sizes of valleys and draws are major features to consider when studying the terrain of a given area. These irregularities in the surface of the earth influence tactics by the degree of observation they provide the opposing forces, the ease or difficulty of movement, and the degree of protection provided against enemy fire. Flat ground provides equal observation for the opposing forces; normally, high ground in rolling or mountainous terrain provides for better observation.

Any advances made parallel to a series of ridges or to a river or stream are mechanically easier than movement perpendicular to them. The steepness of a slope may limit movement; tanks, for instance, cannot climb slopes greater than 30 degrees. Flat ground offers little protection against enemy fire, but rolling ground will, particularly against flat-trajectory weapons.

2.2.2 Vegetation

Vegetation is classified for practical purposes as either natural or cultivated. Natural vegetation includes all types of plant life, i.e., grasses, bushes, and trees growing without the assistance of man. Cultivated vegetation includes all crops and orchards tended by man. Density, height, and types of growth, as well as the diameter of tree trunks, are significant features when studying vegetation.

Although vegetation may restrict vision, it offers concealment and limited cover. Of course, the thicker the growth, the harder it is for the forces to move about.

2.2.3 Surface Materials

Surface materials are studied to determine the trafficability of an area. “Trafficability” is defined as the ability of a soil in its normal state to support vehicular traffic moving cross-country or on unimproved roads and trails. In general, all types of soil, except very loose sand, afford good trafficability when dry. However, soils are seldom completely dry. Water may change soil from hard, baked clay to a slippery, impassable mud within a matter of minutes, especially in tropical areas. Another aspect to consider, along with the types and condition of the soils, is the slope of the ground, the type of vegetation, and the roughness of the surface.

2.2.4 Cultural Features

Cultural features include man-made structures, such as towns, airfields, roads, railroads, and bridges. For military purposes, man-made structures are considered an integral part of terrain. Cities and towns are frequently the objectives of an attacking force. For tactical purposes, cultural features may be centers of resistance as well as physical obstacles to an offensive path. Roads, railroads, and bridges are vulnerable links in logistics and communication networks.

3.0.0 MILITARY ASPECTS OF TERRAIN

Various combinations of weather and topography give certain qualities to an area. These qualities, known as the MILITARY ASPECTS OF TERRAIN, must be closely evaluated by each unit leader. These qualities determine, to a large degree, how forces and weapons are employed. These military aspects of terrain can be remembered by using the acronym KOCOA.

K – Key terrain features

O – Observation and fields of fire

C – Cover and concealment

O – Obstacles

A – Avenues of approach

3.1.0 Key Terrain Features

Key terrain is any locality or area that provides the possessor a marked advantage over the enemy. Usually, the factors that make a feature or an area key terrain are superior observation and fields of fire. Obstacles may be considered key terrain when their possession by one force prevents the movement of the opposing force. In areas, such as mountains and jungles, where movement depends on established roads and paths, routes of communications could be key terrain. A bridge over an unfordable river could be key terrain, particularly when seizing it eliminates the need for an assault crossing.

An airfield could be key terrain when seizing it facilitates the success of local operations or serves as a base to support future operations.

In selecting key terrain, the unit leader is beginning to tie the mission to the ground. Inasmuch as key terrain features offer an advantage to one or both combatants, it is apparent that the defender will strive to retain them while the attacker tries to seize them. For this reason, key terrain is often assigned as the objectives of attacking units; conversely, key terrain aids the defender in disposing forces to best maintain a battle position.

Selection of key terrain features varies according to the mission. In the attack, the unit leader selects key terrain features forward of the line of departure. In the defense, the terrain that must be held to maintain the integrity of the battle position is designated as key terrain.

Selection of key terrain also varies at the different levels of command. For example, at force level, a large city may offer a marked advantage as a communications center or as a base for supply and maintenance facilities. At division or regiment level, high ground dominating the city may be important for observation and establishing fields of fire. At battalion, company, and lower echelons, key terrain might be hills and valleys within the general high ground around the city.

3.2.0 Observation and Fields of Fire

OBSERVATION of the battlefield is essential to bring effective fire on the enemy, to control maneuvering of the troops, and to prevent being surprised by the enemy. Observation is classified as either long or short range. Long-range observation is that which provides observation in excess of the effective range of small-arms fire (usually over 400 meters). Short-range observation covers the immediate foreground and extends to the effective range of small-arms fire. Observation is limited or denied by such factors as fog, heavy precipitation, heat refraction, darkness, vegetation, cultural features, and relief.

FIELDS OF FIRE are areas into which weapons can be fired effectively. An ideal field of fire for the defense would be gentle sloping ground, fitted to the trajectory of the weapons being used, and on which the enemy can be seen with no protection from fire. This situation is rarely encountered. However, improvement to the natural fields of fire can be made by cutting or burning weeds, grass, and crops; by clearing brush and trees; by demolishing buildings; and by cutting lanes through woods. The commander must exercise caution in ordering such work, since obviously constructed fire lanes can disclose the location of troop positions to an observant enemy.

Observation and fields of fire are so closely related that they are considered together. They are not synonymous, but fields of fire are based on observation, since the enemy must be seen to bring effective fire. These aspects are particularly important to the defender. The primary considerations for choosing a defensive position are maximum observation and long fields of fire.

3.3.0 Cover and Concealment

COVER is shelter protection from enemy fire—either natural or artificial. Geographical relief features, drainage areas, cultural features, and other artificial shelters provide cover. Cover from flat trajectory fire is best exemplified by the concept of reverse slope; that is, when there is a projection of relief, such as a hill, between the opposing forces. Cover must be considered in relation to the types of fire encountered. For example, a

trench offers excellent protection against rifle fire, but only limited protection against mortar or artillery fire.

CONCEALMENT is protection from observation. Vegetation, cultural features, geographical relief features, drainage areas, weather conditions, and darkness can provide protection from observation. Frequently, concealment can be obtained by properly evaluating and using just the terrain. At other times, artificial means (camouflage), in addition to natural, available concealment may be needed.

Concealment is the reverse concept of observation. Since the defender usually has the opportunity to choose which area to defend, positions that take maximum advantage of natural cover and concealment by adding field fortifications and natural concealment with camouflage to improve the position are selected. It is important to judge cover and concealment by looking at it from the point of view of a potential attacker.

3.4.0 Obstacles

Obstacles are obstructions that stop or divert troop movement. Common natural obstacles of military value include mountains, rivers, streams, lakes, marshes, gullies, steep inclines, and heavily wooded areas. Common artificial obstacles include minefield, cut and fills, trenches, antitank ditches, roadblocks, barbed wire, blown bridges, and road craters. The proper evaluation of natural obstacles permits the most effective use of artificial obstacles. Obstacles perpendicular to the advance route of the enemy generally favor the defending force. Obstacles parallel to the advance of the enemy may favor the enemy by protecting their flanks, although the obstacles may also limit their lateral movement. The effectiveness of an obstacle must be carefully examined. An obstacle by itself is rarely an absolute block to military movement by a determined enemy. A defender who puts full faith in an obstacle by itself stands the risk of being surprised by enemy movement over or through that obstacle. Maximum effectiveness is gained from an obstacle kept under observation and fire.

3.5.0 Avenues of Approach

An avenue of approach is a terrain feature or combination of features that offer a maneuvering unit a suitable route of movement to their objective. The following are desirable characteristics of an avenue of approach:

- Ease of movement toward the objective
- Favorable observation and fields of fire for the attacker
- Adequate room for maneuver and dispersal by the attacking unit
- Cover and concealment from the fire and observation of the defender

A defender must pay particular attention to all avenues of approach. These approaches into the Seabee position represent potential weak spots in the defense, and Seabees must be positioned to block and cover them effectively. A defender must also consider the use of these avenues of approach by friendly forces should a counterattack be launched.

4.0.0 MAPS AND THE COMPASS

In a combat situation, the ability to read and use a map and compass could save a life. When separation occurs during a night patrol, it is imperative to be able return to friendly lines unaided. This could be next to impossible without using a map that shows

the approximate location of friendly forces. With a map and compass, locating current position and following a route to a predetermined destination is essential.

4.1.0 Maps

A map (*Figure 5-1*) is a small-scale, flat-surfaced representation of a part of the surface of the earth. Man-made and natural features are shown by the use of symbols, lines, colors, and forms. Maps show the location and distances between ground features, such as towns, populated areas, roads, airfields, streams, and other lines of communication. They also indicate variations in the landform and the height of natural features.

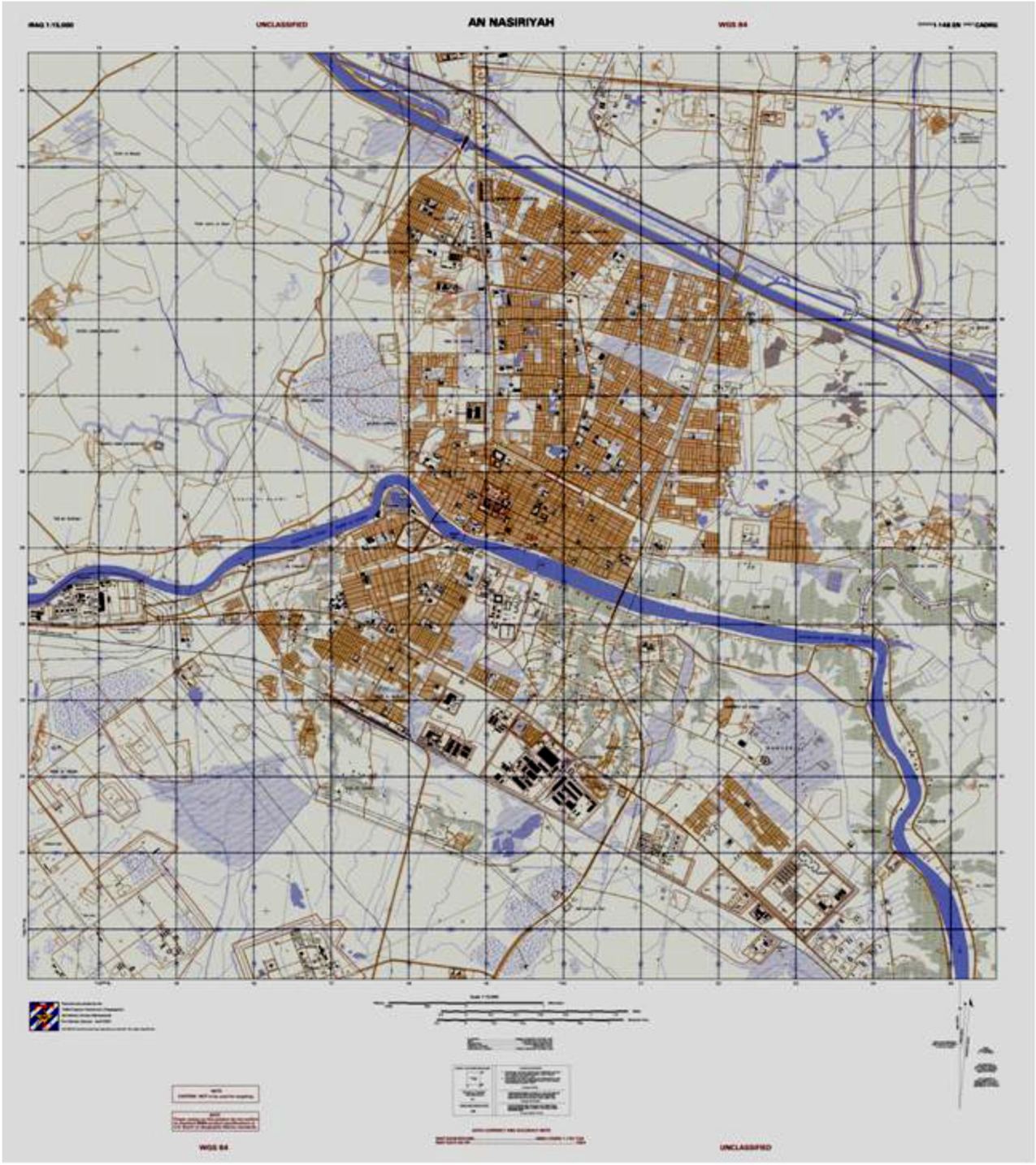


Figure 5-1 — Map.

Some of the types of maps used are as follows:

- Topographic map. This map portrays terrain and landforms in a measurable form as well as the horizontal positions of the features represented. The vertical positions, or relief, are normally represented by contours. On relief maps, the elevations and contours are measured from a specified vertical datum plane, usually mean sea level.
- Planimetric map. This map presents only the horizontal positions for the features represented. The omission of relief in a measurable form distinguishes it from a topographic map.
- Photomap. A photomap is a reproduction of an aerial photograph upon which grid lines, marginal data, place names, route numbers, important elevations, boundaries, and approximate scale and direction have been added.
- Pictomap. This is a map on which the photographic imagery of a standard photomap has been converted into interpretable colors and symbols.
- Photomosaic. A photomosaic is an assembly of aerial photographs that is commonly called a mosaic in topographic usage. Mosaics are useful when time does not permit the compilation of a more accurate map. The accuracy of a mosaic depends on the method employed in its preparation and may vary from simply a good pictorial effect of the ground to that of a planimetric map.
- Terrain model. A terrain model is a scale model of the terrain showing features, and in large-scale models showing industrial and cultural shapes. It provides a means for visualizing the terrain for planning or indoctrination purposes and for briefing on assault landings.
- Military city map. A military city map is a topographic map (usually at 1:1,250 scale, sometimes up to 1:5,000), showing the details of a city. It delineates streets and shows street names, important buildings, and other elements of the urban landscape important to navigation and military operations in urban terrain. The scale of a military city map depends on the importance and size of the city, density of detail, and available intelligence information.
- Special maps. Special maps are for special purposes such as trafficability, communications, and assault maps. They are usually in the form of an overprint in the scales smaller than 1:100,000 but larger than 1:1,000,000. A special purpose map is one that has been designed or modified to give information not covered on a standard map. The wide range of subjects that could be covered under the heading of special purpose maps prohibits, within the scope of this manual, more than a brief mention of a few important ones, these include:
    - Terrain features
    - Drainage characteristics
    - Vegetation
    - Climate
    - Coasts and landing beaches
    - Roads and bridges
    - Railroads
    - Airfields

- Urban areas
- Electric power
- Fuels
- Surface water resources
- Ground water resources
- Natural construction materials
- Cross-country movements
- Suitability for airfield construction
- Airborne operations

4.1.1 Reference Systems

One of the oldest reference systems is based upon the geographic coordinates—meridians and parallels. Meridians are great circles of north-south rings crossing the equator at right angles and converging at the North and South Poles (*Figure 5-2, frame 1*). One meridian that runs through Greenwich, England, is known as the prime meridian (*Figure 5-2, frame 2*). Meridians are used to measure LONGITUDE—the distance of a point east or west of the prime meridian. PARALLELS are great circles of east-west rings running parallel to the equator. Parallels are used to measure LATITUDE—the distance of a point north or south of the equator. Using meridians and parallels, any point on the surface of the earth can be located.

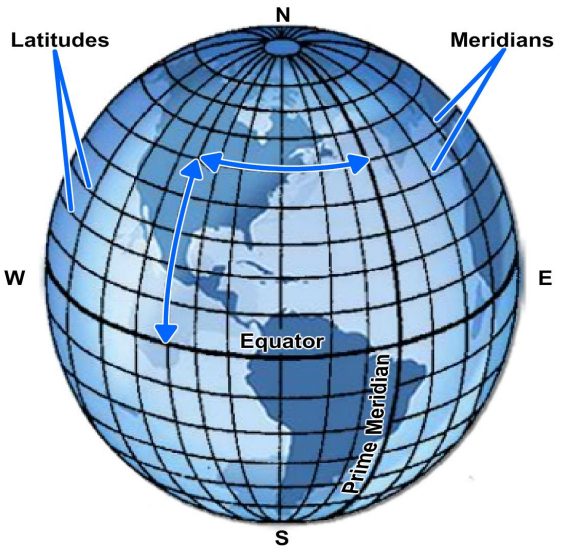


Figure 5-2 — Reference lines and position location.

Geographic coordinates are expressed in angular measurement. The earth is divided into 360 degrees; each degree into 60 minutes; and each minute into 60 seconds. The degree is symbolized by °; the minute by´; and the second by´´.

Starting with 0° at the equator, the parallels of latitude are numbered to 90° both north and south. The extremities are the North Pole at 90° north latitude and the South Pole at 90° south latitude. Latitude can have the same numerical value north or south of the equator, so the direction N or S must always be given.

Starting with 0° at the prime meridian, longitude is measured both east and west around the world. Lines east of the prime meridian are numbered from 0° to 180° and are identified as east longitude. Lines west of the prime meridian are numbered 0° to 180° and are identified as west longitude. The direction E or W must always be given to longitude. The line directly opposite the prime meridian, 180°, may be referred to as either east or west longitude.

4.1.2 Grids

Military maps are divided into grids to provide a uniform system for referencing and making measurements. Military grids consist of two sets of equally spaced parallel,

Interaction Available

straight lines intersecting at right angles and forming a series of squares. Each grid line is an even interval of the selected measurement unit, such as yards or meters. A portion of a military grid, or map, is shown in *Figure 5-1*. The dimensions and orientation of different types of grids vary, but all military grids have three things in common:

1. They are all true rectangular grids.
2. They are superimposed; that is, drawn on top of the geographic projection.
3. They permit linear and angular measurements.

The regularly spaced lines that make up the grids on any large-scale map are divisions of the 100,000-meters square; the lines are spaced at 10,000- or 1000-meter intervals. Each of these lines is labeled at both ends with a number showing its relation to the origin of the zone. For the 1000-meter grid, except for the numbers labeling the first grid line in each direction from the southwest corner of the sheet, the last three digits (000) of the number are omitted. Two digits of the numbers are printed in large type, and the same two digits appear at intervals along the grid line on the face of the map. They are called the PRINCIPAL DIGITS and represent the 10,000 and 1,000 digits of the grid number; they are of major importance to the map reader because they are numbers used most often for referencing points. The smaller digits complete the COORDINATES of the grid lines, but they are rarely used for point designation. On sheets with grid line spacing at 10000 meters, only one principal digit is shown, representing the 10,000 digit of the grid number.

The designation of a point is based on the military principle of "Read RIGHT then UP." The precision desired determines the number of digits to be read beyond the principal digits. Remember that the term grid coordinate often indicates both the 100,000-meters-square identification and the desired number of digits. In many instances, it is a tactical requirement that the 100,000-meters-square identification be included in any point designation. *Figure 5-3* shows a section of a simple grid system. Each line is numbered, starting at the lower left-hand corner, reading to the right and up. Remember, when reading a military map, it should always be read from left to right and from bottom to top. Three squares in *Figure 5-3* have numbers in them to identify that particular grid square. The letter X has been placed in grid square 6937. To locate this point more precisely, see *Figure 5-4*. The sides of the grid square have been divided into ten parts. This can be done by eye or with a scale. As shown in this figure, the X is located at coordinate 697373. The grid coordinates are

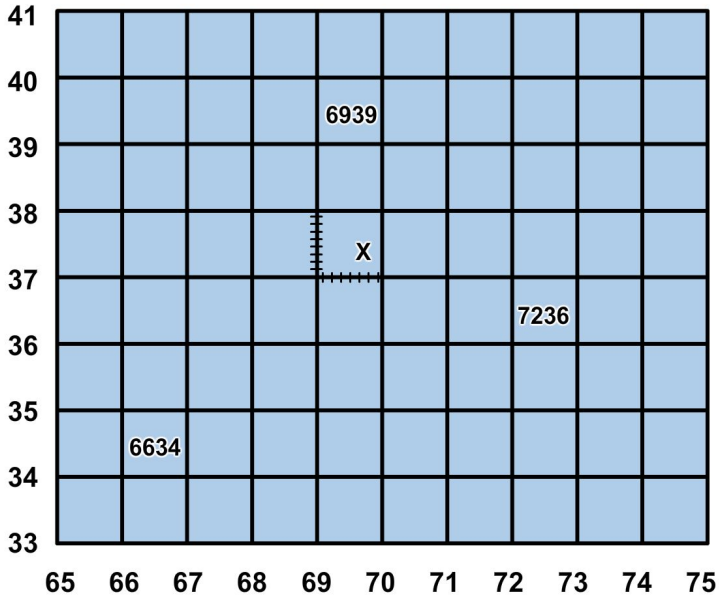


Figure 5-3 — Grid system.

written as one number but always contain an even number of digits. Examples are 6937 and 697373.

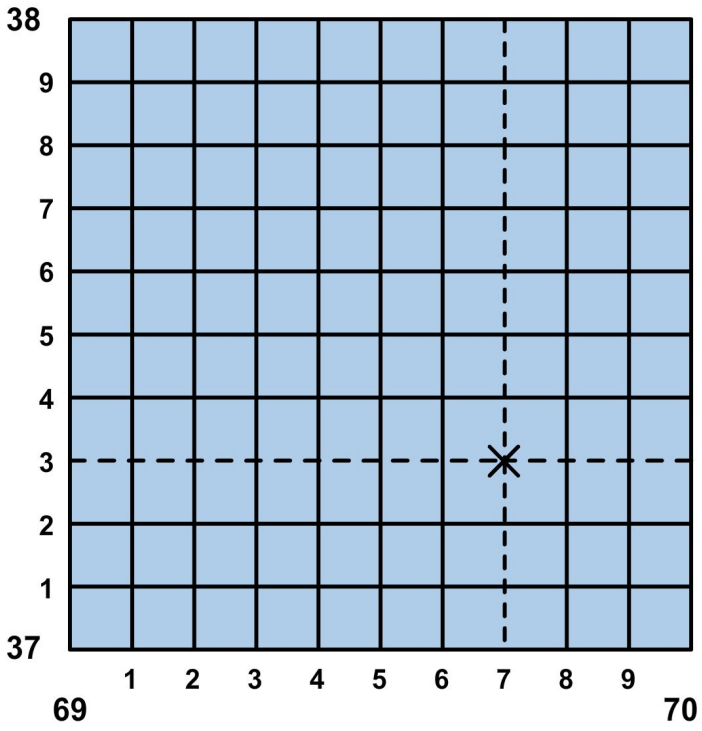


Figure 5-4 — Grid square.

4.1.3 Elevation and Relief

Knowledge of map symbols, grids, scale, and distance provides enough information to identify two points. Once located, measure between the points, and determine the length of time required to travel between them. The map user must also become proficient in recognizing the various landforms and irregularities of the surface of the earth. For instance, what if there is a 300-foot cliff between the two points of travel? Once proficiency is reached the elevation and differences in the height of all terrain features can be easily determined. Some other terms to become familiar with are:

- DATUM PLANE. This is a reference from which vertical measurements are taken. The datum plane for most maps is mean, or average, sea level.
- ELEVATION. This is defined as the height (vertical distance) of an object above or below a datum plane.
- RELIEF. Relief is the representation of the shape and height of landforms and the characterization of the surface of the earth.

The elevation of points and the relief of an area affect the movement and deployment of units by limiting the route of travel, their speed of movement, and the ease or difficulty of attacking or defending an area. Also, relief affects observation, fields of fire, cover, concealment, and the selection of key terrain features.

4.1.4 Contour Lines

There are several ways of indicating elevation and relief on maps. The most common way is by contour lines. A CONTOUR LINE is a line representing an imaginary line on the ground along which all points are at the same elevation.

Contour lines indicate a vertical distance above or below a datum plane. Starting at sea level, normally the zero contours—and each contour line—represents an elevation above sea level. The vertical distance between adjacent contour lines is known as the CONTOUR INTERVAL. The amount of the contour interval is given in the marginal information. On most maps, the contour lines are printed in brown. Starting at zero elevation, every fifth contour line is drawn with a heavier line. These are known as INDEX CONTOURS. Someplace along each index contour, the line is broken and its elevation is given. The contour lines falling between index contours are called INTERMEDIATE CONTOURS. They are drawn with a finer line than the index contours and, usually, do not have their elevations given.

Use the following steps to determine the elevation of a point on a map:

1. Find the contour interval of the map from the marginal information, and note both the amount and the unit of measure.
2. Find the numbered contour line (or other given elevation) nearest the point for which the elevation is being sought.
3. Determine the direction of slope from the numbered contour line to the desired point.
4. Count the number of contour lines that must be crossed to go from the numbered line to the desired point and note the direction—up or down. The number of lines crossed multiplied by the contour interval is the distance above or below the starting value.

When the desired point is on a contour line, its elevation is that of the contour.

For a point between contours, most military needs are satisfied by estimating the elevation to an accuracy of one half of the contour interval. All points less than one fourth of the distance between the lines are considered to be at an elevation of one half of the contour interval above the lower line (*Figure 5-5*).

To estimate the elevation of the top of an unmarked hill, add half of the contour interval to the elevation of the highest contour line around the hill.

To estimate the elevation of the bottom of a depression, subtract half of the contour interval from the value of the lowest contour around the depression.

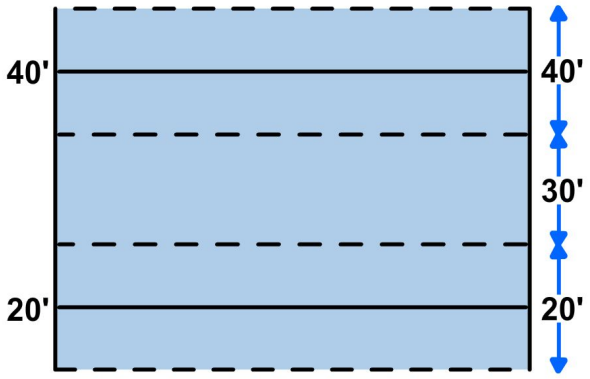


Figure 5-5 — Estimating elevations between contour lines.

On some maps, the index and intermediate contour lines do not show the elevation and relief in as much detail as may be needed; then SUPPLEMENTARY CONTOURS may be used. These contour lines are dashed brown lines, usually at one half of the contour interval for the map. A note in the marginal information indicates the interval used. They are used exactly like solid contour lines.

On some maps, the contour lines may not meet the standards of accuracy but are sufficiently accurate in both value and interval to be shown as contours rather than as form lines. On maps of this type, the contours are considered as approximate and are shown with a dashed symbol; elevation values are given at intervals along the heavier (index contour) dashed lines. The contour note in the map margin identifies them as approximate contours.

In addition to the contour lines, bench marks and spot elevations are used to indicate points of known elevation on the map. BENCH MARKS—the more accurate of the two—are symbolized by a black X, for example, XBM 124. The elevation value shown in black refers to the center of the X. SPOT ELEVATIONS are shown by a brown X and are usually located at road junctions and hilltops and other prominent terrain features. If the elevation is shown in black numerals, it has been checked for accuracy. If it is in brown, it has not been checked.

NOTE

New maps are being printed using a Dot (●) instead of brown Xs.

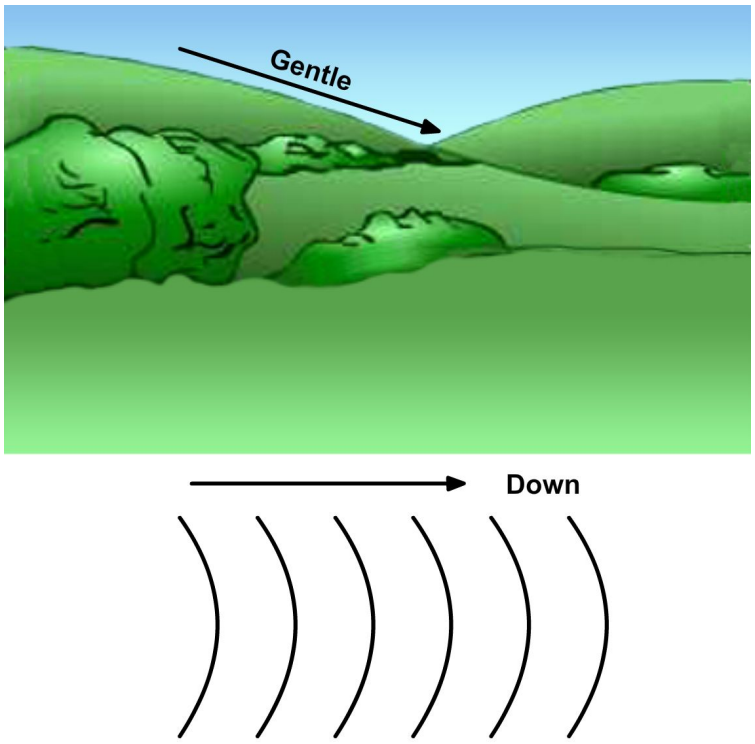


Figure 5-6 — Uniform gentle and steep slopes.

The spacing of the contour lines indicates the nature of the slope. Contour lines evenly spaced and wide apart indicate a uniform, gentle slope (*Figure 5-6, frame 1*). Contour lines evenly spaced and close together indicate a uniform, steep slope. The closer the contour lines are to each other, the steeper the slope (*Figure 5-6, frame 2*).

Contour lines closely spaced at the top and widely spaced at the bottom indicate a concave slope (*Figure 5-7, frame 1*). Considering relief only, an observer at the top of a concave slope can observe the entire slope and the terrain at the bottom. However, a unit attacking up a concave slope would have no cover or concealment from observers or weapons at or near the top; also, farther up the slope, the climb would be more difficult.

Contour lines widely spaced at the top and closely spaced at the bottom indicate a convex slope (*Figure 5-7, frame 2*). An observer at the top of a convex slope would have no observation of most of the slope or of the terrain at the bottom. But, a unit

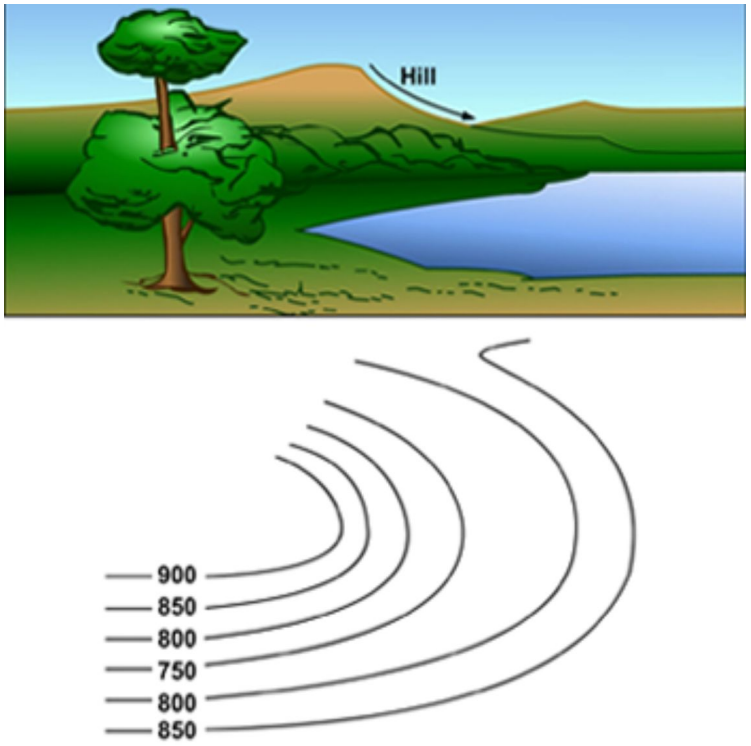


Figure 5-7 — Concave and convex slopes.

Interaction Available

Interaction Available

attacking up a concave slope would have a much greater degree of cover and concealment than on a convex slope; also, the climb farther up the slope would be easier.

In order to show the relationship of land formations to each other and how they would be symbolized on a contour map, stylized panoramic sketches of the major relief formations are drawn. Then a contour map of each sketch is developed. Each of the figures that follow shows a sketch and a map with a different relief feature and its characteristic contour pattern.

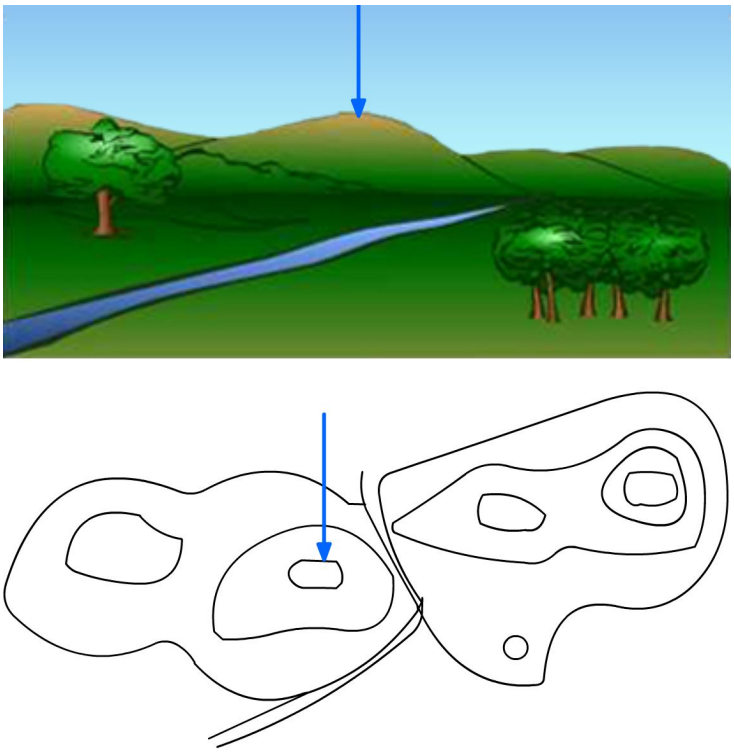


Figure 5-8 — Hill, valley, and draw.

A HILL is a point or small area of high ground (*Figure 5-8, frame 1*). From a position located on a hilltop, the ground slopes down in all directions.

A VALLEY (*Figure 5-8, frame 2*) is a course of a stream that has at least a limited extent of reasonably level ground bordered on the sides by higher ground. The valley generally has maneuvering room within its confines. Contours indicating a valley are U-shaped and tend to parallel a major stream before crossing it. The more gradual the fall of a stream, the farther each contour parallels it. The curve of the contour crossing always points upstream.

A DRAW (*Figure 5-8, frame 2*) is a less developed course of a stream in which there is essentially no level ground and, therefore, little or no maneuvering room within its confines. The ground slopes upward on each side and toward the head of the draw. Draws occur frequently along the sides of ridges at right angles to the valleys between them. Contours indicating a draw are V-shaped, with the point of the V toward the head of the draw.

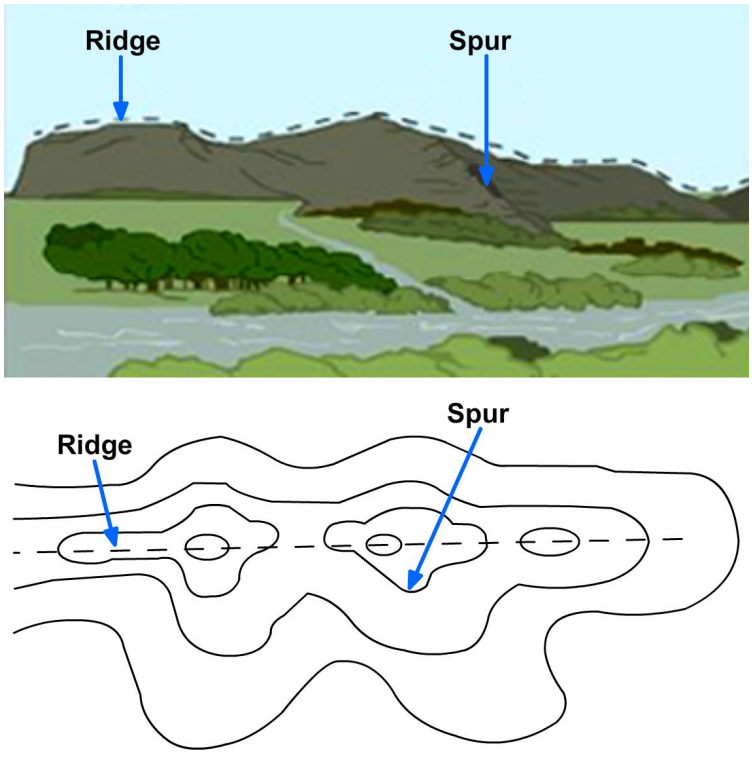


Figure 5-9 — Ridge, spur, and saddle.

Normally, a RIDGE (*Figure 5-9, frame 1*) is a line of high ground with minor variations along its crest. The ridge is not simply a

Interaction Available
Interaction Available

line of hills; all points of the ridge crest are appreciably higher than the ground on both sides of the ridge.

A SPUR (*Figure 5-9, frame 2*) is a short, continuously sloping line of higher ground normally jutting out from the side of a ridge. A spur is often formed by two roughly parallel streams cutting draws down the side of a ridge.

A SADDLE (*Figure 5-9, frame 3*) is a dip or low point along the crest of a ridge. A saddle is not necessarily the lower ground between two hilltops; it may simply be a dip or break along an otherwise level ridge crest.

A CLIFF (*Figure 5-10, frame 1*) is a vertical or near vertical slope. When a slope is so steep that it cannot be shown at the contour interval without the contours coming together, it is shown by a ticked “carrying” contour or contours. The ticks always point toward lower ground.

CUTS and FILLS (*Figure 5-10, frame 2*) are man-made features caused when the bed of a road or railroad is graded or leveled by cutting through high areas and filling in low areas along the right-of-way.

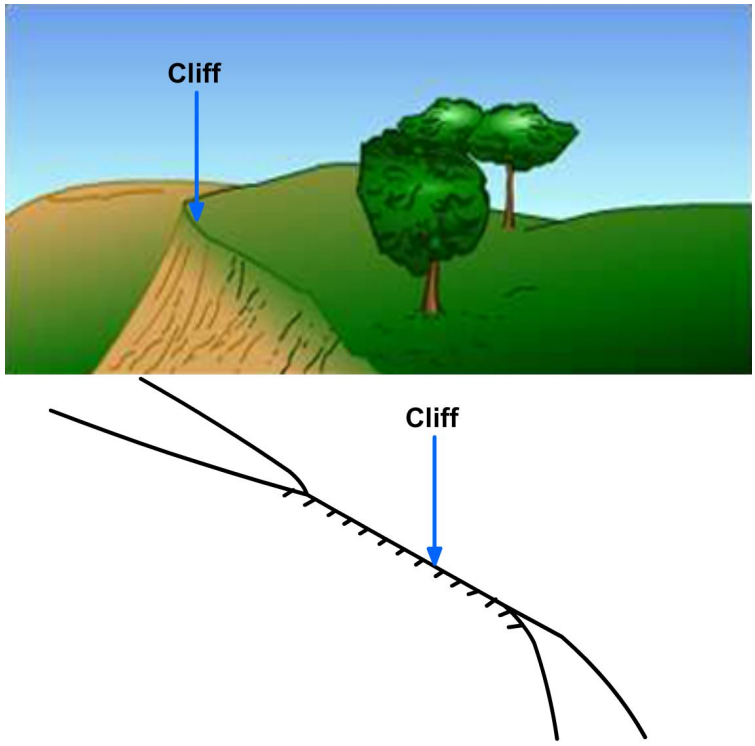


Figure 5-10 — Cliff, cuts, fills and depressions.

A DEPRESSION (*Figure 5-10, frame 3*) is a low point or a sinkhole, surrounded on all sides by higher ground.

4.1.5 Slope

The rate of rise or fall of a landform is known as its slope and may be described as being gentle or steep. The speed at which equipment or personnel can move is affected by the slope of the ground. Most equipment has a limit on the steepness of slope it can negotiate. So a more exact way of describing a slope is demanded. Slope (*Figure 5-11*) may be expressed in several ways, but all of them depend upon a comparison of vertical distance (VD) to horizontal distance (HD). VD is the difference between the highest and lowest elevations of the slope and is determined from the contour lines. HD is the horizontal ground distance between the highest and the lowest elevations of the slope.

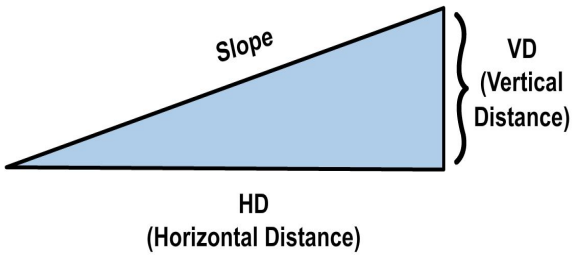


Figure 5-11 — Slope diagram.

Interaction Available

The VD and HD must be expressed in the same units. Both measurements must be made with extreme accuracy in order to have a valid determination of steepness. The computations normally are made for only the steepest part of a slope.

4.1.6 Scale and Distance

A map is a graphic representation of an area and, therefore, is not made to full scale (actual size). Since it is not full size, some means of measuring the distance from one point on the map to another is necessary. This is done with the aid of a scale.

There are two types of scales in general use on military maps. The first is called a graphic scale and is indicated by a special scale legend that is printed on the map. The second type of scale is the ratio between the horizontal distance on the map and the corresponding distance on the ground.

The GRAPHIC SCALE that is printed on a map is specially made for that map and should not be used on any other map. *Figure 5-12* shows a typical graphic scale. To the right of the zero (0), the scale is marked in full units of measure and is called the Primary Scale. The part to the left is zero (0) and is divided into tenths of a unit and is called the EXTENSION SCALE. Most maps have three or more graphic scales, each of which indicates distance in a different unit of measure. To determine the straight-line distance between two points on a map, use the following steps:

1. Lay the straightedge of a piece of paper on the map so the edge of the paper touches both points.
2. Make a mark on the edge of the paper at each point.
3. Move the paper down to the graphic scale, and from the scale, read the ground distance between the points. Be sure to use the scale that indicates the unit of measure desired.

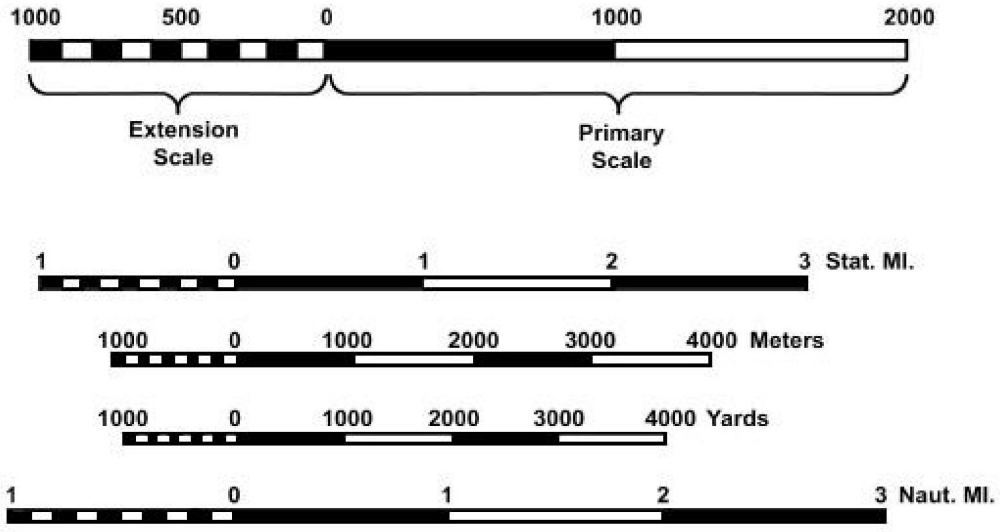


Figure 5-12 — Graphic scale.

To measure distance along a winding road, stream, or other curved line, the straightedge of a piece of paper should be used again.

1. Make a mark at or near one end of the paper and place it at the point from which the line is to be measured, as shown in *Figure 5-13*.
2. Align the edge of the paper along a straight portion, and make a tick mark on both the map and the paper at the end of the aligned portion.
3. Keeping both tick marks together, place the point of the pencil on the tick mark of the paper to hold it in place. Pivot the paper until another straight portion is aligned and make another mark on both map and paper.
4. Continue in this manner until the measurement is complete. Then place the paper on the graphic scale and read the ground distance.

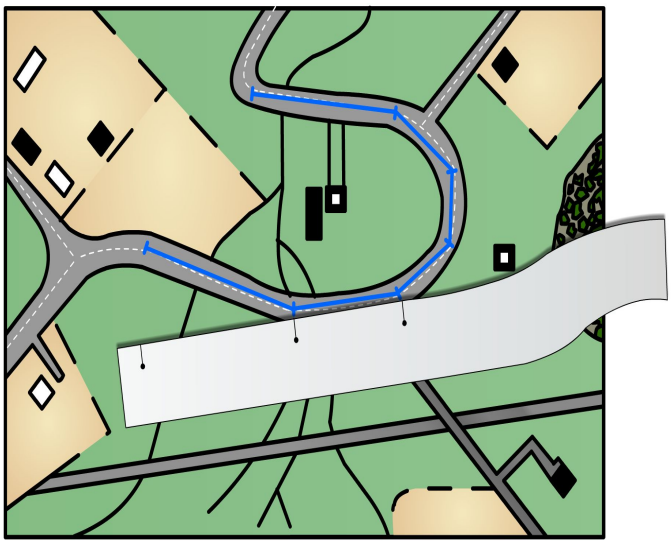


Figure 5-13 — Measuring curved line distance on a map.

The RATIO-TYPE SCALE is simply a comparison between a given distance measured on the map and on the ground. It is independent of any unit of measure. A scale of 1/25,000 means that one unit of measure on the map is equal to 25,000 of the same units of measure on the ground. The ground distance between two points may be determined by measuring between the points on the map and multiplying the map measurement by the scale. For example, the distance between two bridges on a certain map is 15 inches. The scale of the map is 1:50,000. Therefore, the actual distance on the ground is found by multiplying 15 inches by 50,000 (15 times 50,000 equals 750,000 inches). Then convert the answer into a more relevant unit. These units might be feet, yards, meters, kilometers, or miles. To change the 750,000 inches to feet, divide by 12 (the number of inches in a foot); hence 750,000 divided by 12 equals 62,500 feet. To change the 62,500 feet to miles, divide again by 5,280 (the number of feet per mile); thus 62,500 divided by 5,280 equals 11.8 miles. To change the 11.8 miles to kilometers, multiply by 1.609; therefore 11.8 times 1.609 equals 18.99 kilometers. Using either of the methods described above can determine the distance between any two points.

NOTE

Most military ground navigation maps use the metric system.

4.1.7 Direction

Directions are expressed in everyday life as right, left, straight ahead, and so forth. But the question arises, "*To the right of what?*" Military personnel require a method of expressing a direction that is accurate, adaptable for use in any area of the world, and has a common unit of measure.

Interaction Available

Directions are expressed as units of angular measure, and there are several systems used.

1. The most commonly used unit of angular measure is the degree with its subdivisions of minutes and seconds.
2. Another unit, less frequently used, is the mil (abbreviated m). For the U.S. military purposes, a complete circle is divided into 6,400 mils. The mil is commonly used in artillery, tank, and mortar gunnery. It is convenient for many practical uses because it is approximately one unit of length at a distance (range) of one thousand units.

4.1.8 Base Line

In order to measure anything, there must always be a starting point, or zero measurement. To express a direction as a unit of angular measure, there must be a starting point, or zero measure, and a point of reference. These two points designate the base, or reference, line. There are three base lines–true north, magnetic north, and grid north. Those most commonly used are magnetic and grid; the magnetic when working with a compass, and the grid when working with a military map.

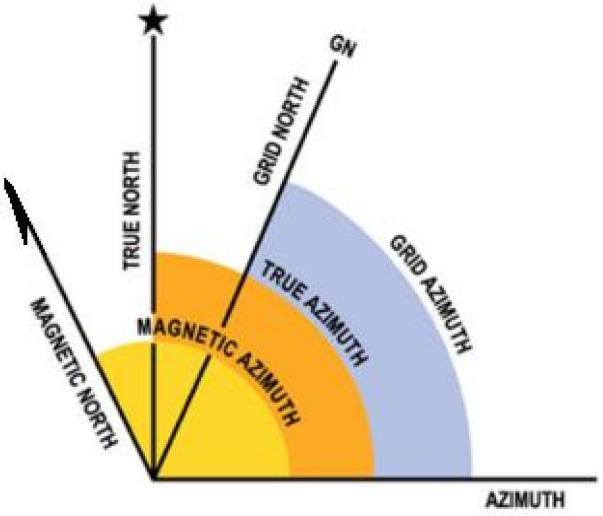


Figure 5-14 — True, magnetic and grid azimuths.

TRUE NORTH is a line from any position on the surface of the earth to the North Pole. All lines of longitude are true north lines. True north is usually symbolized by a star (*Figure 5-14*).

MAGNETIC NORTH is the direction to the magnetic North Pole and is indicated by the north-seeking needle of a magnetic instrument. Magnetic north is usually symbolized by a half arrowhead (*Figure 5-14*).

GRID NORTH is the north established by the vertical grid lines on the map. Grid north may be symbolized by the letters GN (*Figure 5-14*).

4.1.9 Topographic Map Symbols

The purpose of a topographic map is to permit visualization of an area of the surface of the earth with pertinent features properly positioned. Ideally, all features within an area would appear on the map in their true proportion, position, and shape. However, this is not practical. Many of the features would be unimportant and others could not be recognized because of their reduction in size. Therefore, the map maker has been forced to use symbols to represent these features (*Figure 5-15*). These symbols resemble, as closely as possible, the actual features themselves.

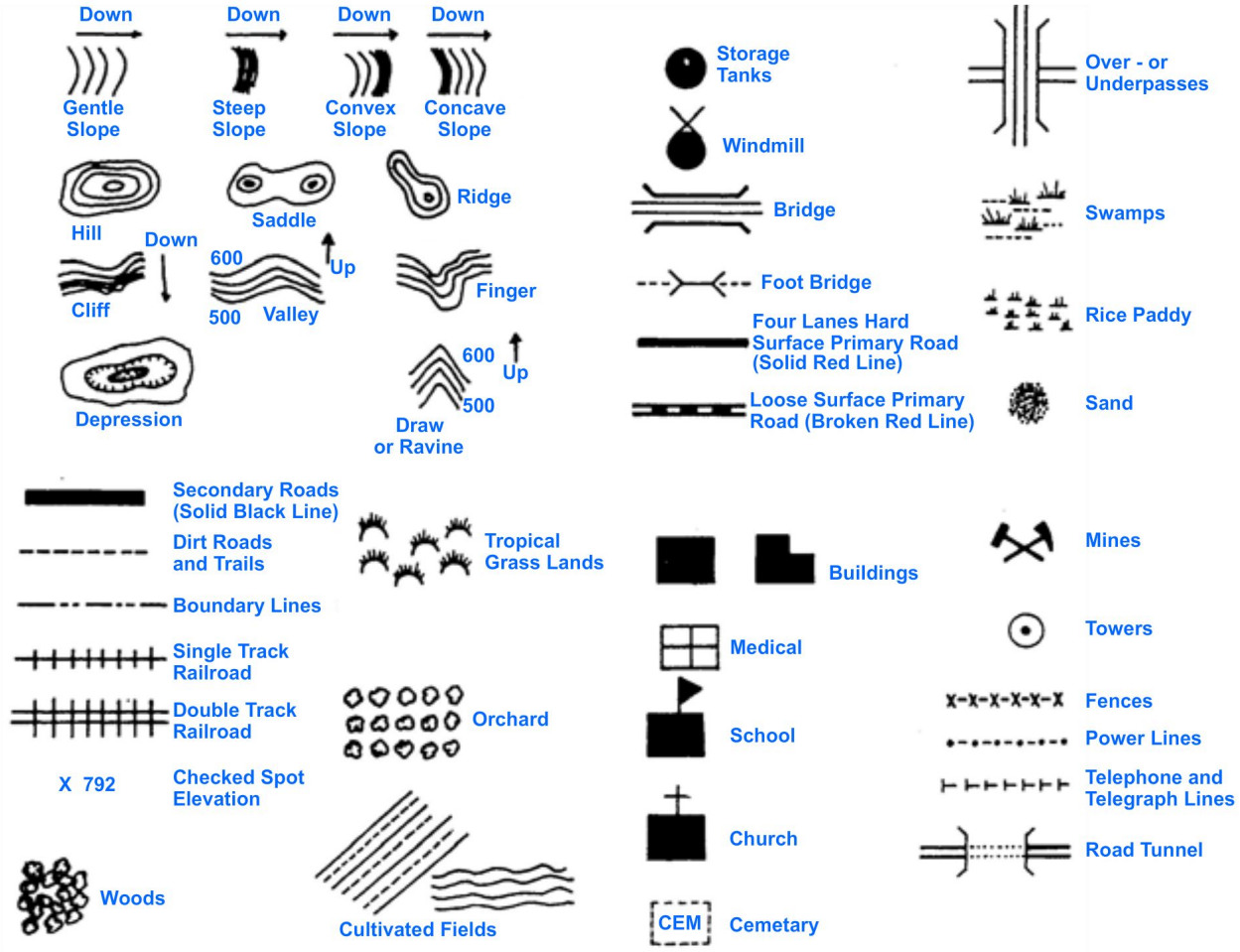


Figure 5-15 — Topographic symbols.

Topographic symbols are usually printed in a number of standardized colors. This is done so the features on the map are easier to identify and to give them a more natural appearance and contrast.

Black – the majority of cultural or man-made features

Blue – water features, such as lakes, rivers, and swamps

Green – vegetation, such as woods, orchards, or vineyards

Brown – all relief features, such as contours

Red – main roads, built up areas, and special features

Others – occasionally used to show special information; generally, explained in the marginal notes

4.1.10 Military Symbols

In addition to topographic symbols used to represent natural and man-made features of the earth, the military establishment requires some method for showing the identity, strength, locations, and movements of its troops, activities, and installations. The symbols used to represent these features are known as military symbols. As these features are constantly changing and moving, they are not normally printed on maps. They appear on special maps and overlays and are handled by following proper security precautions. *Figure 5-16* shows many of these symbols.

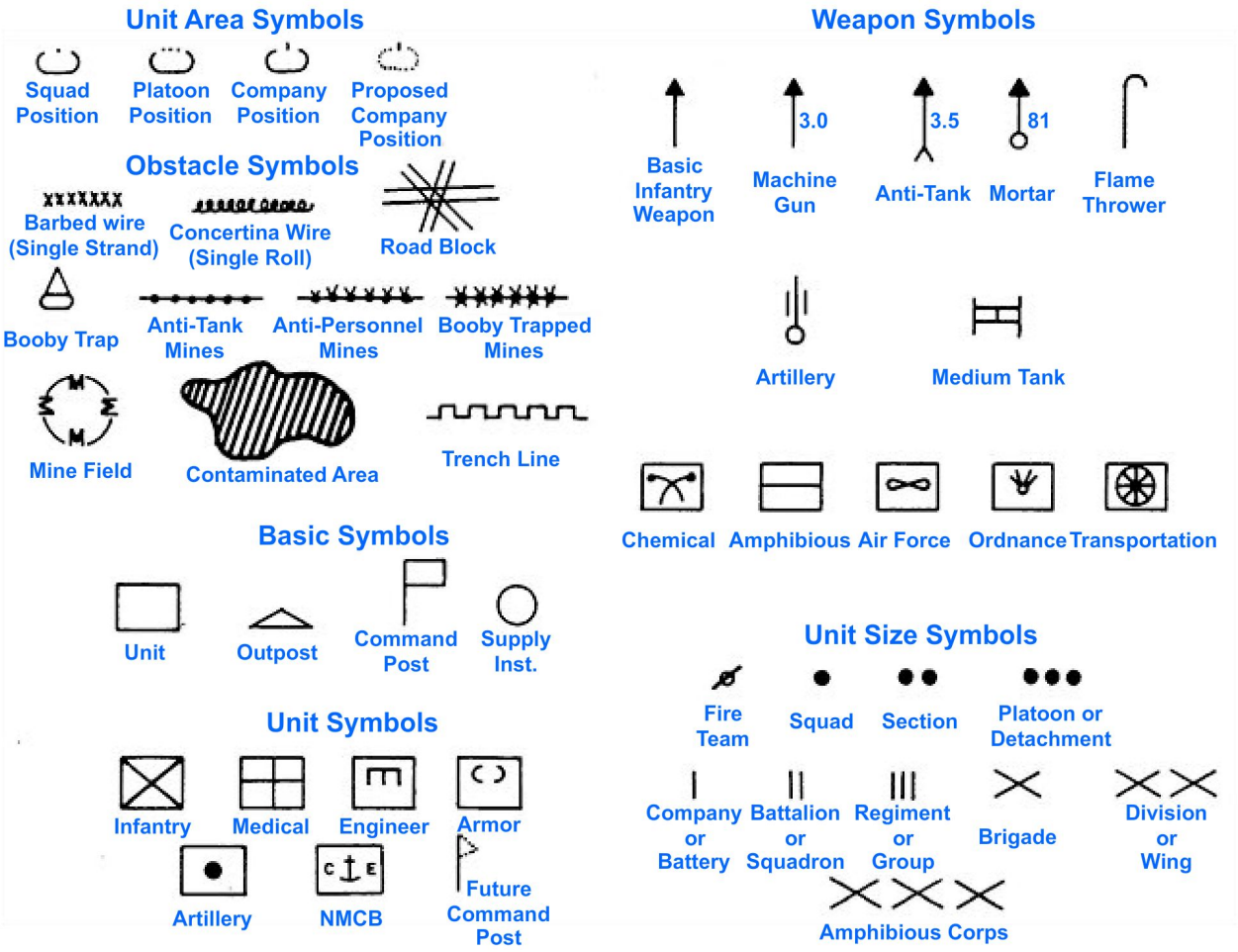


Figure 5-16 — Typical military symbols.

4.1.11 Care of Maps

One of the first precautions in caring for maps is folding the map properly. *Figure 5-17, frame 1,* shows two ways of folding maps to make them small enough to be carried easily and still be available for use without having to unfold them entirely.

Protect the maps; they may have to last a long time. Whenever possible, carry a map in a waterproof packet, in a pocket, under an outer garment, or other place where it is handy but still protected.

Another way to fold a map is done by cutting a section of the map on a grid line. Once the cut is made, fold the map as shown in *Figure 5-17, frame 2.*

In marking a map, use light lines that maybe erased easily without smearing, smudging, or leaving marks that may later tend to confuse someone. If the margins of a map need to be trimmed, be careful to copy any marginal information that may be needed later, such as grid and magnetic declination data or overlapping grid values and ticks.

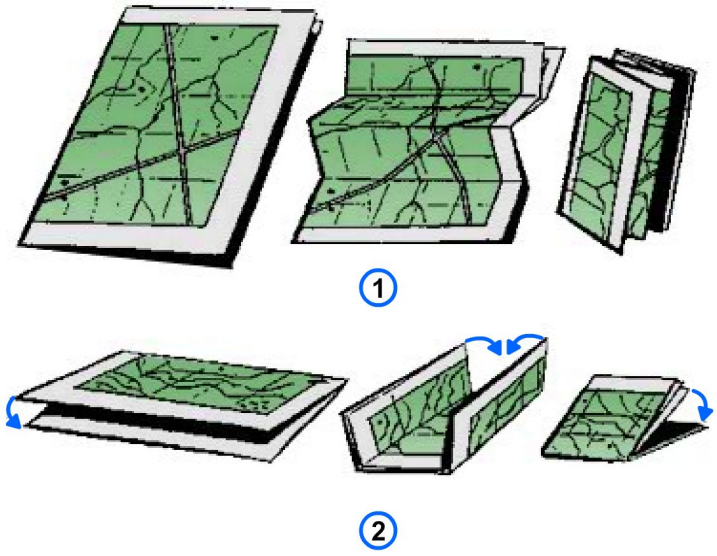


Figure 5-17 — Two methods of folding a map and how to slit and fold.

Interaction Available

5.0.0 NAVIGATION EQUIPMENT AND METHODS

5.1.0 Lensatic Compass

The lensatic compass is the most commonly used and simplest instrument for measuring directions and angles in the field.

The lensatic compass (*Figure 5-18*) consists of three major parts: the cover, the base, and the lens.

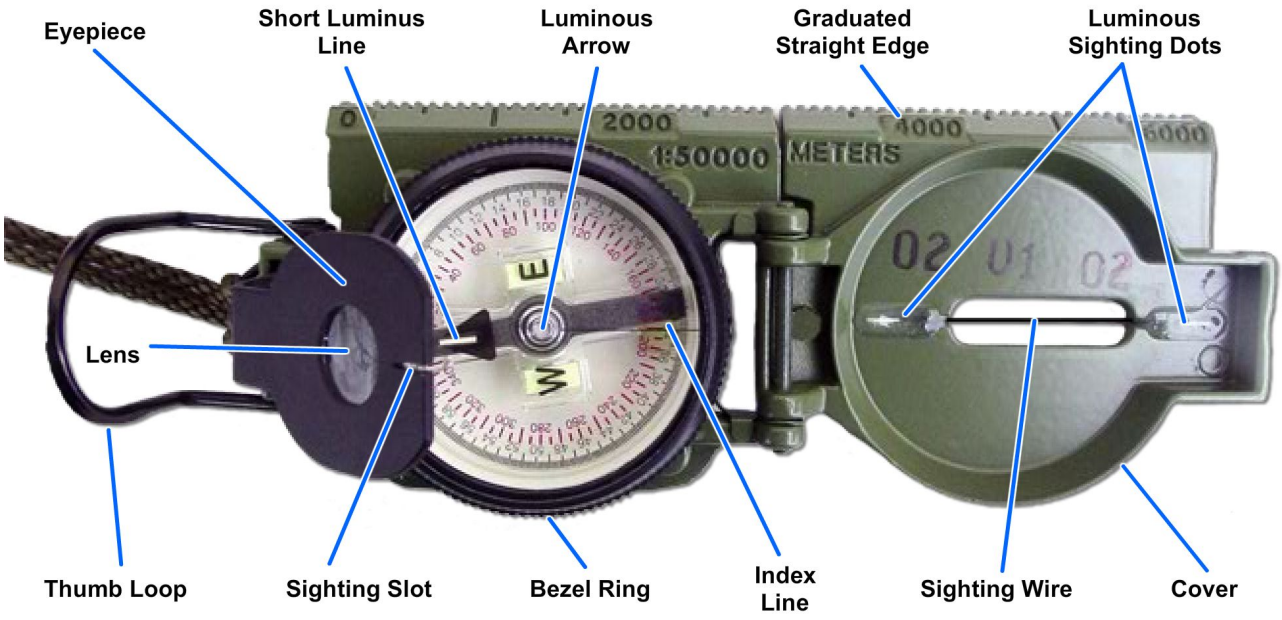


Figure 5-18 — Lensatic compass.

5.2.0 Compass Handling

Compasses are delicate instruments and should be cared for accordingly.

INSPECTION— A detailed inspection is required when first obtaining and using a compass. One of the most important parts to check is the floating dial, which contains the magnetic needle. The user must also make sure the sighting wire is straight, the glass and crystal parts are not broken, the numbers on the dial are readable, and most important, that the dial does not stick.

EFFECTS OF METAL AND ELECTRICITY—Metal objects and electrical sources can affect the performance of a compass. However, nonmagnetic metals and alloys do not affect compass readings. The following separation distances are suggested to ensure proper functioning of a compass:

High-tension power lines	55 meters
Field gun, truck, or tank	18 meters
Telegraph or telephone wires and barbed wire	10 meters
Machine gun	2 meters
Rifle	1/2 meter

ACCURACY—A compass in good working condition is very accurate. However, a compass has to be checked periodically on a known line of direction, such as a surveyed azimuth, using a declination station. Compasses with more than 3 degrees variation should not be used.

PROTECTION—If traveling with the compass unfolded, make sure the rear sight is fully folded down onto the bezel ring. This will lock the floating dial and prevent vibration, as well as protect the crystal and rear sight from damage.

5.2.1 Using a Compass

Magnetic azimuths are determined using magnetic instruments such as lensatic compass. Employ the following techniques when using the lensatic compass.

A. **Using the Centerhold Technique.**

1. Open the compass to its fullest so that the cover forms a straightedge with the base.
2. Move the lens (rear sight) to the rearmost position, allowing the dial to float freely.
3. Place thumb through the thumb loop, form a steady base with your third and fourth fingers, and extend your index finger along the side of the compass.
4. Place the thumb of the other hand between the lens (rear sight) and the bezel ring; extend the index finger along the remaining side of the compass, and the remaining fingers around the fingers of the other hand.
5. Pull your elbows firmly into your sides; this will place the compass between your chin and your belt.
6. To measure an azimuth, simply turn entire body toward the object, pointing the compass cover directly at the object. Once you are pointing at the object, look down and read the azimuth from beneath the fixed black index line (*Figure 5-19*).



Figure 5-19 — Holding a lensatic compass.

This preferred method offers the following advantages over the sighting technique:

- It is faster and easier to use.
- It can be used under all conditions of visibility.
- It can be used when navigating over any type of terrain.
- It can be used without putting down the rifle; however, the rifle must be slung well back over either shoulder.
- It can be used without removing eyeglasses.

B. **Using the Compass-to-Cheek Technique.**

1. Fold the cover of the compass containing the sighting wire to a vertical

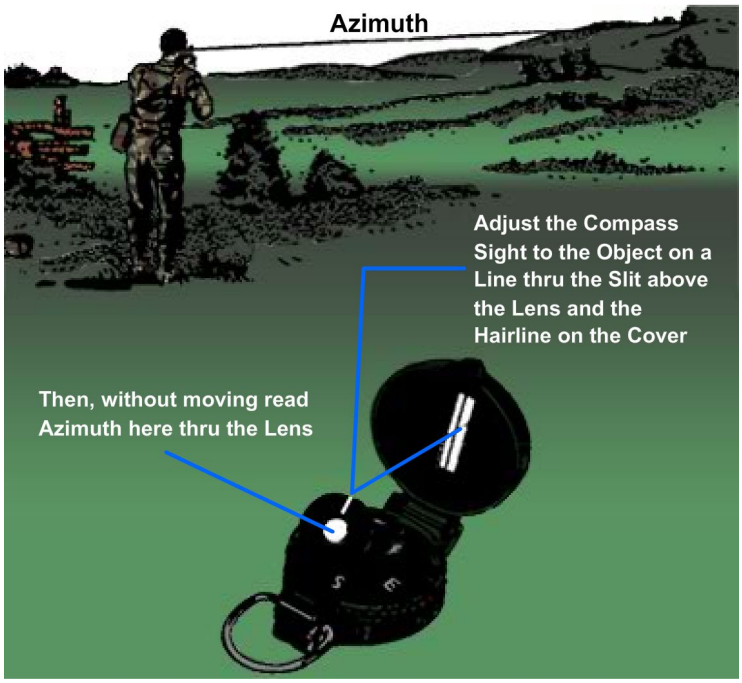


Figure 5-20 — A method of determining the azimuth of a visible object.

position; then fold the rear sight slightly forward.

2. Look through the rear-sight slot and align the front-sight hairline with the desired object in the distance. (*Figure 5-20*)
3. Glance down at the dial through the eye lens to read the azimuth (*Figure 5-21*).

NOTE

The compass-to-cheek technique is used almost exclusively for sighting, and it is the best technique to use for “Intersection” and “Resection” (discussed later in this chapter).



Figure 5-21 — Compass to cheek technique.

For night use, special features of the compass are the luminous markings and the 3° bezel serration and clicking device. Turning the bezel ring to the left causes an increase in azimuth, while turning it to the right causes a decrease. The bezel has a stop and spring that allows clockwise and counterclockwise turns at 3° intervals per click and holds the bezel ring in any desired position. One method for determining compass directions at night is as follows:

1. Rotate the bezel until the luminous line is over the black index line.
2. Hold the compass with the left hand and continue to rotate the bezel ring with the right hand in a counterclockwise direction for the number of clicks required. The number of clicks is determined by dividing the value of the required azimuth by 3. For example, for an azimuth of 51°, the bezel ring is rotated 17 clicks counterclockwise.
3. Turn the compass until the north arrow is directly under the luminous line on the bezel.
4. Hold the compass open and level in the palm of the left hand with the thumb along the flat side of the compass. In this manner, the compass can be held consistently in the same position. Position the compass approximately halfway between the chin and the belt, pointing directly ahead. A little practice in daylight should increase proficiency in pointing the compass the same way every time. Looking directly down into the compass, turn until the north arrow is under the luminous line. Then move forward in the direction of the front cover luminous sighting dots.

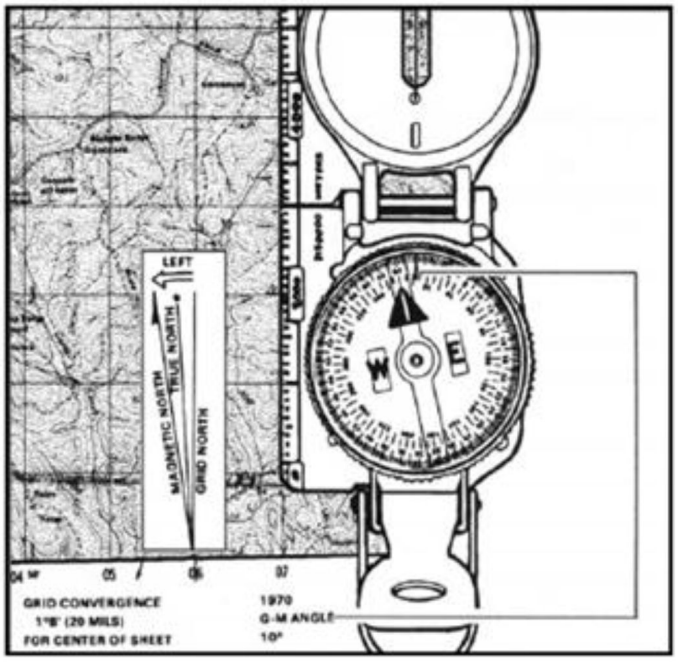
5.3.0 Orientation of the Map

The first step for a navigator in the field is orienting the map. A map is oriented when it is in a horizontal position with its north and south corresponding to the north and south on the ground. Some orienting techniques are described herein.

5.3.1 Using a Compass

When orienting a map with a compass, remember that the compass measures magnetic azimuths. Since the magnetic arrow points to magnetic north, pay special attention to the declination diagram.

1. Determine the direction of the declination and its value from the declination diagram.
2. With the map in a horizontal position, take the straightedge on the left side of the compass and place it alongside the north-south grid line with the cover of the compass pointing toward the top of the map. This procedure places the fixed black index line of the compass parallel to north-south grid lines of the map.
3. Keeping the compass aligned as directed above, rotate the map and compass together until the magnetic arrow is below the fixed black index line on the compass. At this time, the map is close to being oriented.
4. Rotate the map and compass in the direction of the declination diagram.
5. If the magnetic north arrow on the map is to the left of the grid north, check the compass reading to see if it equals the G-M angle given in the declination diagram. The map is then oriented with 10 degrees west declination as shown in *Figure 5-22, frame 1*.
6. If the magnetic north is to the right of grid north (*Figure 5-22, frame 2*), check the compass reading to see if it equals 360 degrees minus the G-M angle.



Interaction Available

Figure 5-22 — Map orientation.

5.3.2 Using Terrain Association

A map can be oriented by terrain association when a compass is not available or when the user has to make many quick references while moving across country. Using this method requires careful examination of the map and the ground, and the user must know their approximate location (*Figure 5-23*).

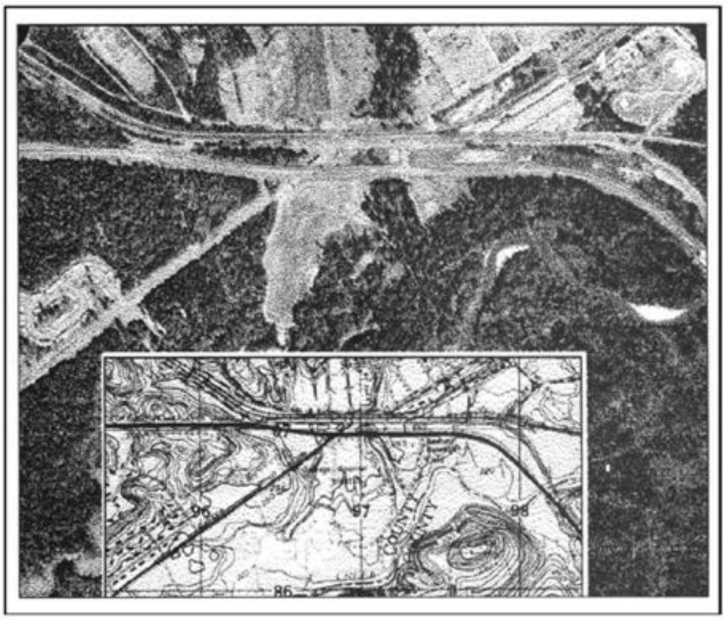


Figure 5-23 — Terrain association.

5.4.0 Azimuth and Back Azimuth

The most common military method of expressing a direction is by using azimuths. As stated before, an “azimuth” is defined as a horizontal angle, measured in a clockwise manner from a north base line. When the azimuth between two points on a map is desired, the points are joined by a straight line. Then a protractor is used to measure the angle between grid north and the drawn line. This measured angle is the grid azimuth of the drawn line (*Figure 5-24, frame 1*). When using an azimuth, imagine the point from which the azimuth originates as the center of the azimuth circle (*Figure 5-24, frame 2*). Azimuths take their name from the base line from which they have been measured; true azimuths from true north, magnetic azimuths from magnetic north, and grid azimuths from grid north. Therefore, any one given direction can be expressed in three different ways: a grid azimuth, when measured on a military map; a magnetic azimuth, when measured by a compass; or a true azimuth, when measured from a meridian of longitude.

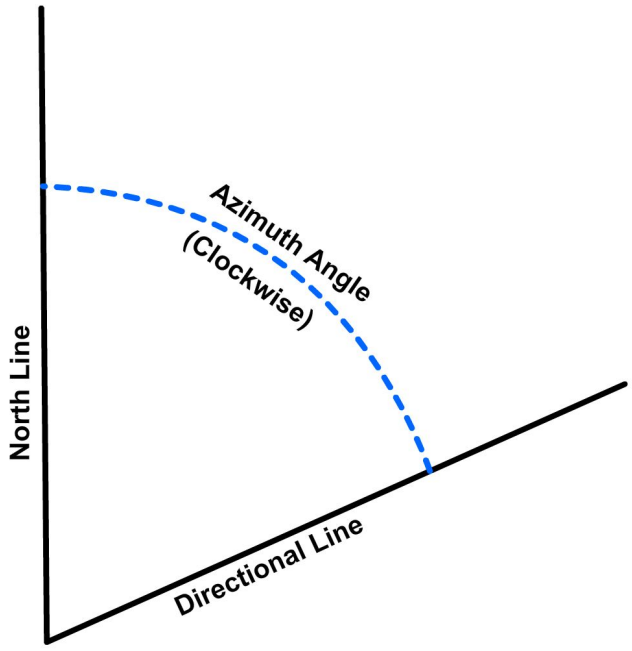


Figure 5-24 — Azimuth angles.

The back azimuth of a line is its forward azimuth plus 180°; or if this sum is greater than 360°, the back azimuth is the forward azimuth minus 180°. For example, if the forward azimuth of a line is 112° (*Figure 5-25*), the back azimuth is as follows:

Interaction Available

112° + 180° = 292°

When the forward azimuth of a line is 310°, the back azimuth is as follows:

310° - 180° = 130°

Figure 5-26 shows an example of how to bypass enemy positions or obstacles by detouring around them. This allows consistent orientation by moving at right angles for specified distances. For example, if moving on an azimuth of 360° and wish to bypass an obstacle or position, change direction to 90° and travel for 100 yards; change direction back to 360° and travel for 100 yards; change direction to 270° and travel for 100 yards; then change direction to 360°; returning to the original azimuth.

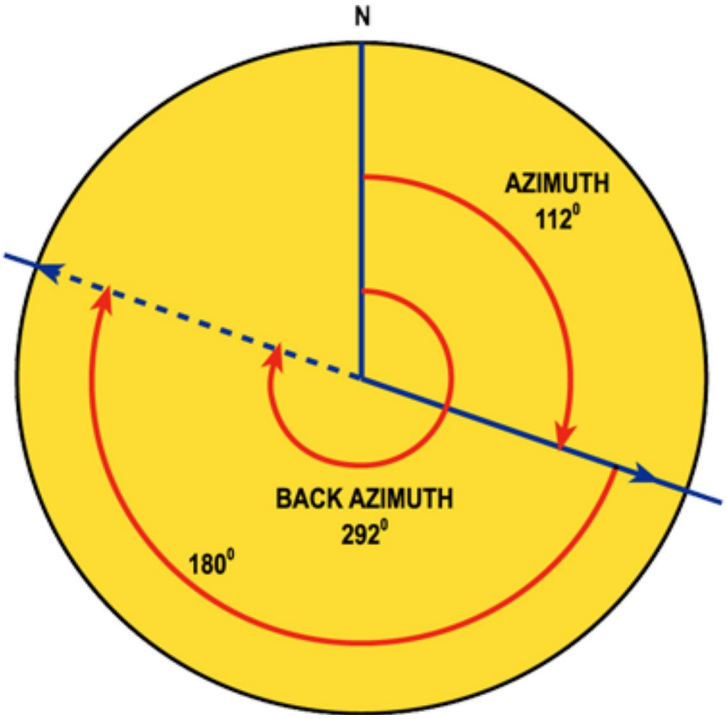


Figure 5-25 — Azimuth and back azimuth.

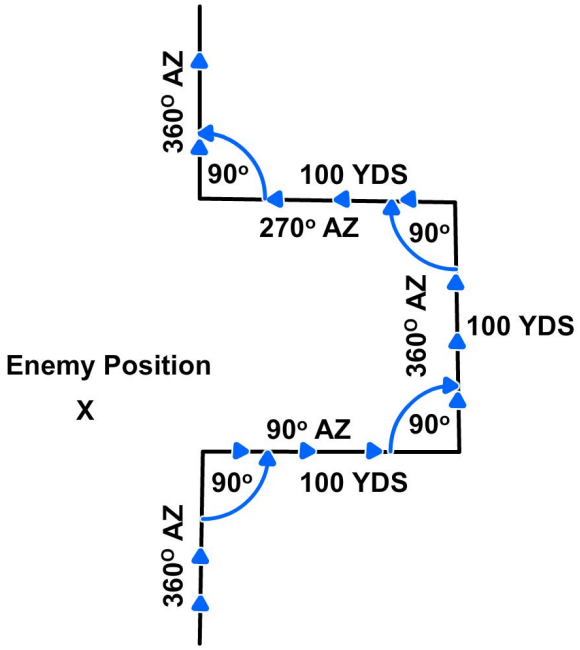


Figure 5-26 — Detour around the enemy.

Bypassing an unexpected obstacle at night is a fairly simple matter. To make a 90° turn to the right, hold the compass as described earlier in the method for night use; turn until the center of the luminous letter *E* is under the luminous line (do NOT change the setting of the luminous line). To make a 90° turn to the left, turn until the center of the luminous letter *W* is under the luminous line. The compass setting (bezel ring) does not require changing, and will ensure accurate 90° turns. For example, a detour to the right is needed. Turn until *E* is under the luminous line and move ahead in that direction until the obstacle has been outflanked. Then turn until the north arrow is under the luminous line and move parallel to the original course until the obstacle has been bypassed. Then turn again until the *W* is under the luminous line and move back the same distance originally moved. Finally, turn until the north arrow is under the luminous line and go ahead on the original course. This method works regardless of what the initial azimuth may be.

5.5.0 Protractor

Protractors come in several forms–full circle, half circle, square, and rectangle (*Figure 5-27*). All of them divide a circle into units of angular measure; and regardless of their shape, they consist of a scale around the outer edge and an index mark. The index mark is the center of the protractor circle from which all the direction lines radiate.

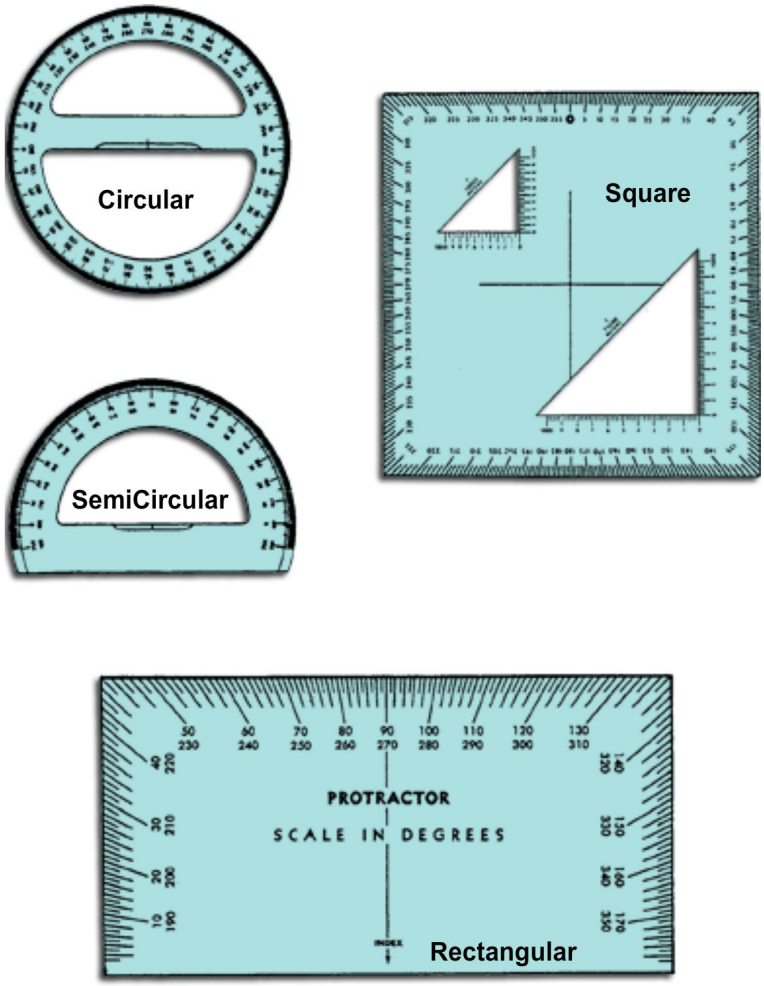


Figure 5-27 — Types of protractors.

The military protractor, GTA 5-2-12, contains two scales: one in degrees (inner scale) and one in mils (outer scale). This protractor represents the azimuth circle. The degree scale is graduated from 0 to 360 degrees with each tick mark representing one degree. A line from 0 to 180 degrees is called the base line of the protractor. The index or center of the protractor is where the base line intersects the horizontal line, between 90 and 270 degrees (*Figure 5-28*).

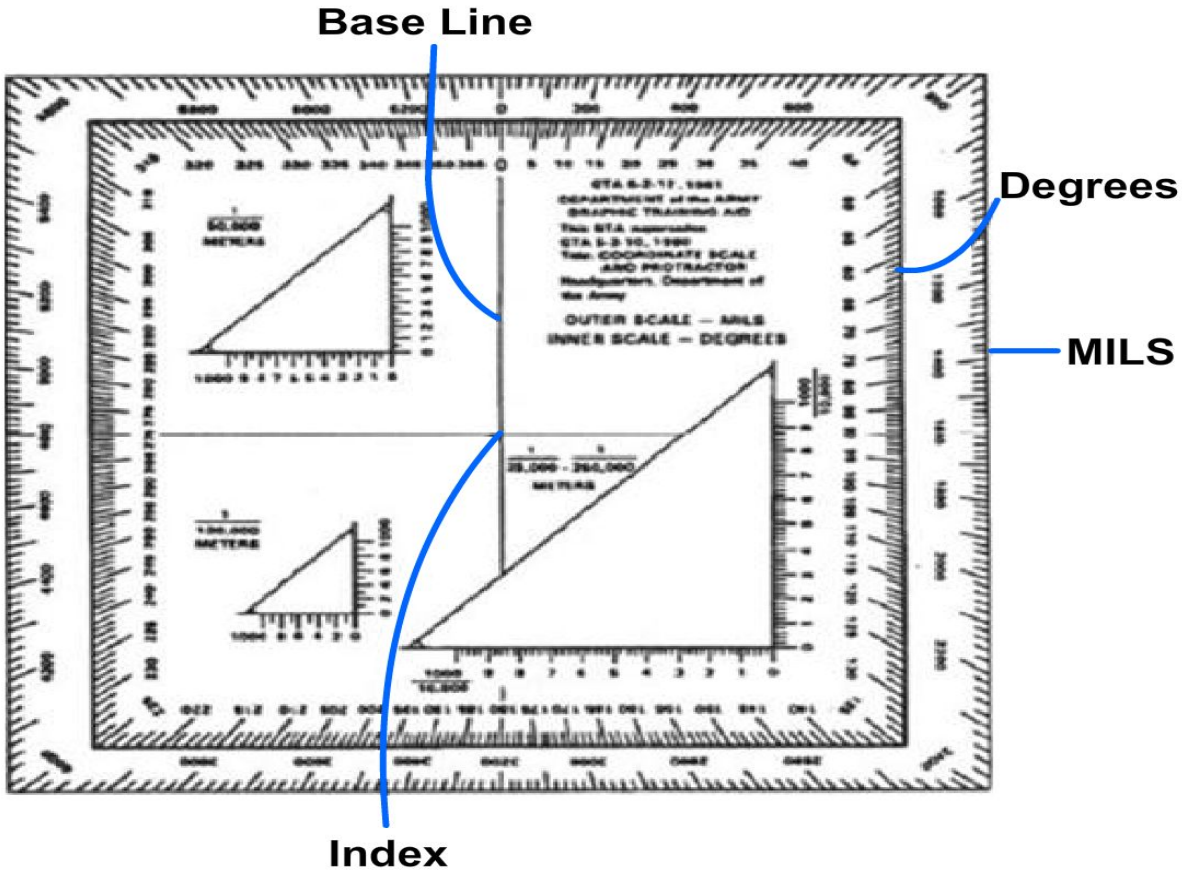


Figure 5-28 — Military protractor.

When using the protractor, the base line is always oriented parallel to a north- south grid line. The 0- or 360-degree mark is always toward the top or north on the map and the 90-degree mark is to the right.

To determine the grid azimuth of a line from one point to another on the map (from A to B or C to D); refer to *Figure 5-29*.

1. Draw a line connecting the two points.
2. Place the index of the protractor at the point where the line crosses a vertical (north-south) grid line.
3. Keeping the index at this point, align the 0°-180° line of the protractor on the vertical grid line.
4. Read the value of the angle from the scale; this is the grid azimuth of the point.

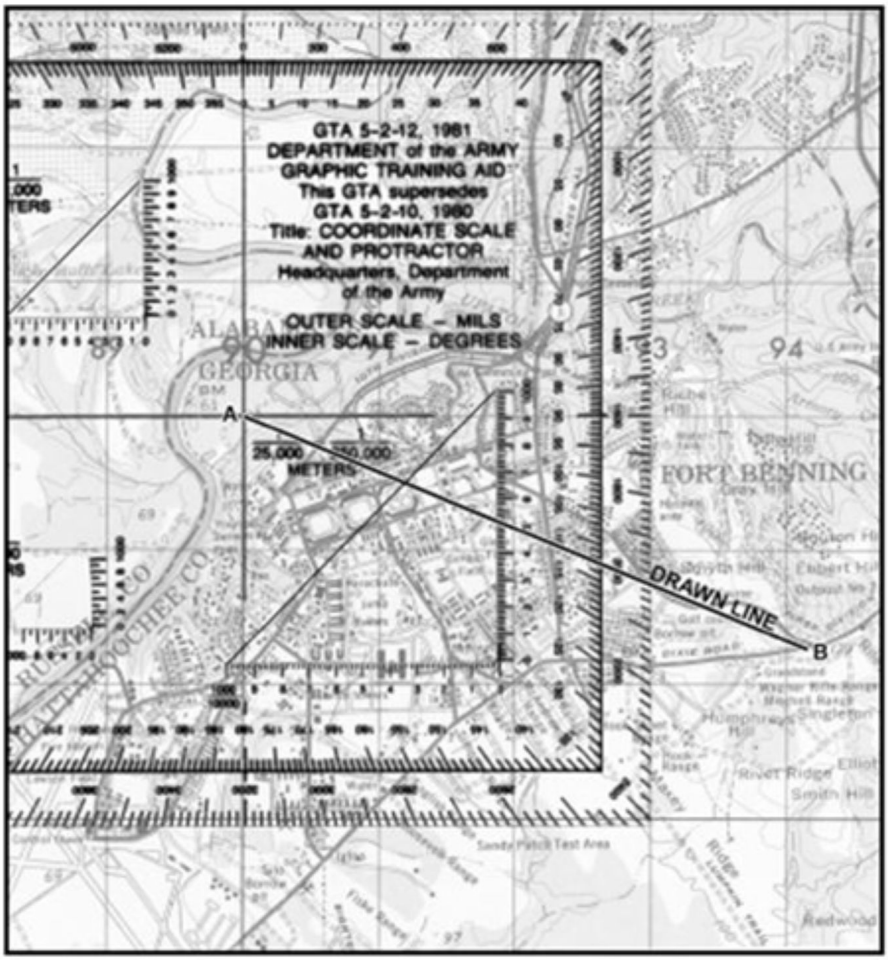


Figure 5-29 — Measuring an azimuth on a map.

To plot a direction line from a known point on a map, refer to *Figure 5-30*.

1. Convert the azimuth from magnetic to grid, if necessary.
2. Place the protractor on the map with the index mark at the center of mass of the known point and the base line parallel to a north-south grid line.
3. Make a mark on the map at the desired azimuth.
4. Remove the protractor and draw a line connecting the known point and the mark on the map. This is the grid direction line (azimuth).

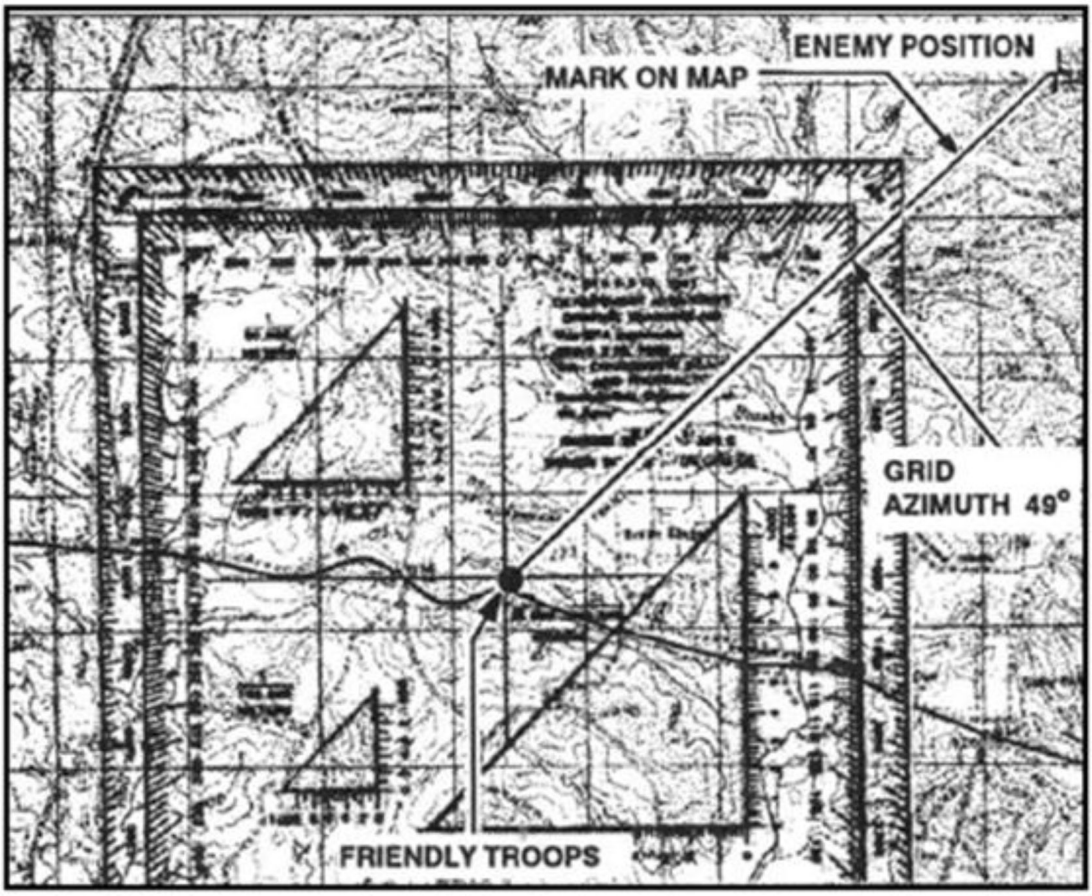


Figure 5-30 — Plotting an azimuth on a map.

5.6.0 Intersection

Locating an unknown point by successively occupying at least two, but preferably three, known positions and sighting on the unknown point is called intersection. It is used to locate features that are not defined on the map or which are not readily identifiable. The two methods of intersection are the map and compass method and the straightedge method.

5.6.1 Map and Compass Method

Study the following steps to locate an unknown point using the map and compass method of intersection (*Figure 5-31*).

1. Orient the map using the compass.
2. Locate and mark your position on the map,
3. Determine the magnetic azimuth to the unknown position using the compass.
4. Convert the magnetic azimuth to grid azimuth.
5. Draw a line on the map from your position on this grid azimuth.
6. Move to a second known point and repeat steps 1, 2, 3, 4, and 5.
7. The location of the unknown position is where the lines cross on the map. Determine the grid coordinates to the desired accuracy.
8. As a check on accuracy, move to a third position (Point C) and repeat Steps above.

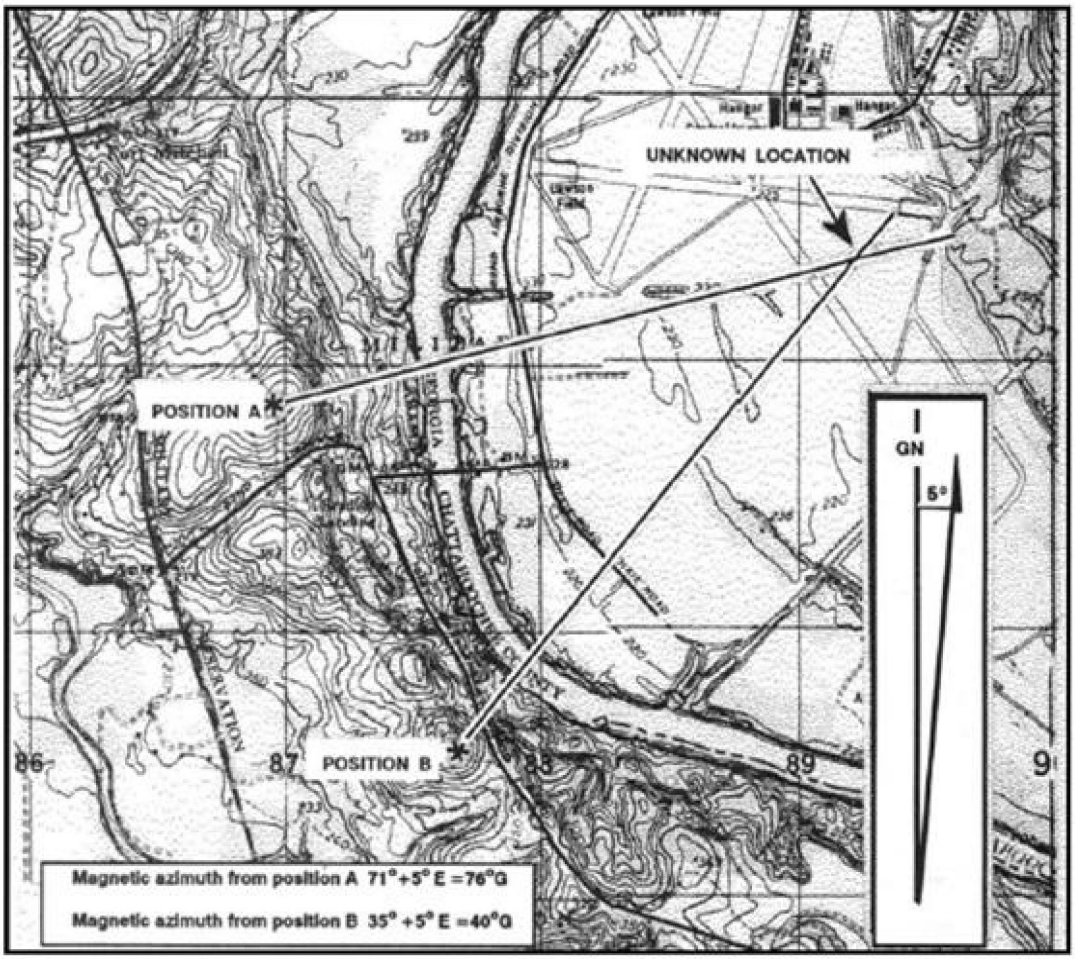


Figure 5-31 — Intersection using map and compass.

5.6.2 Straightedge Method (When no Compass is Available)

Study the following steps to locate an unknown point using the straightedge method of intersection (*Figure 5-32*).

1. Orient the map on a flat surface by the inspection method.

2. Locate and mark current position on the map.
3. Lay a straightedge on the map and place one end at the position of the user (Point A) as a pivot point. Then rotate the straightedge until the unknown point is sighted along the edge.
4. Draw a line along the straightedge.
5. Repeat the above procedures at Point B, and for a check on accuracy, at a third position.
6. The intersection of the lines is the location of unknown Point C.

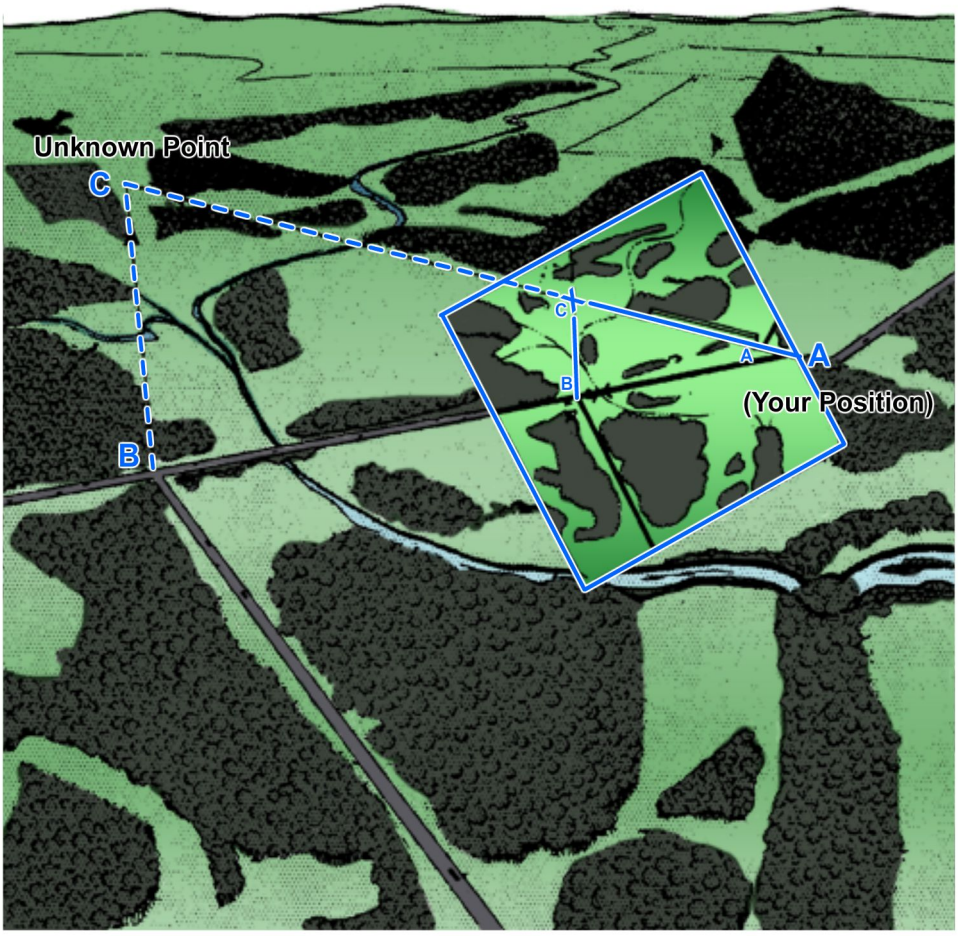


Figure 5-32 — Intersection without a compass.

5.7.0 Resection

Locating the unknown position of the user by sighting on two or three known features is called resection (*Figure 5-33*). Resection can be done with or without a compass.

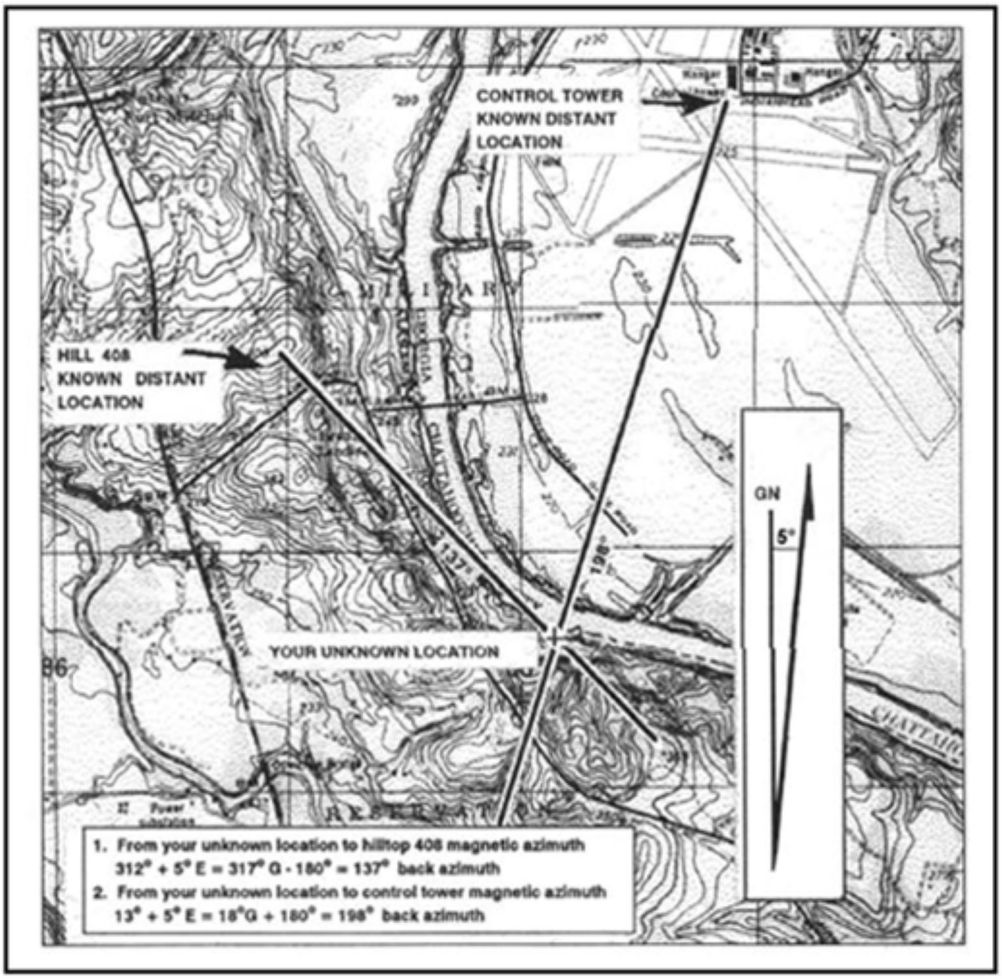


Figure 5-33 — Resection using map and compass.

5.7.1 Map and Compass Method

Study the following steps to locate the unknown position of the user by the map and compass method:

1. Orient the map using the compass.
2. Identify two or three known distant locations on the ground and mark them on the map.
3. Measure the magnetic azimuth to one of the known positions from your location using a compass.
4. Convert the magnetic azimuth to a grid azimuth.
5. Convert the grid azimuth to a back azimuth. Using a protractor, draw a line for the back azimuth on the map from the known position back toward your unknown position.
6. Repeat 3, 4, and 5 for a second position and a third position, if desired.
7. The intersection of the lines is your location. Determine the grid coordinates to the desired accuracy.

5.7.2 Resection without a Compass

Study the following steps to locate the unknown position of the user by the straightedge method:

1. Orient the map on a flat surface by the terrain association method.
2. Locate at least two known distant locations or prominent features on the ground and mark them on the map.
3. Lay a straightedge on the map using a known position as a pivot point. Rotate the straightedge until the known position on the map is aligned with the known position on the ground.
4. Draw a line along the straightedge away from the known position on the ground toward your position.
5. Repeat 3 and 4 using a second known position.
6. The intersection of the lines on the map is your location. Determine the grid coordinates to the desired accuracy.

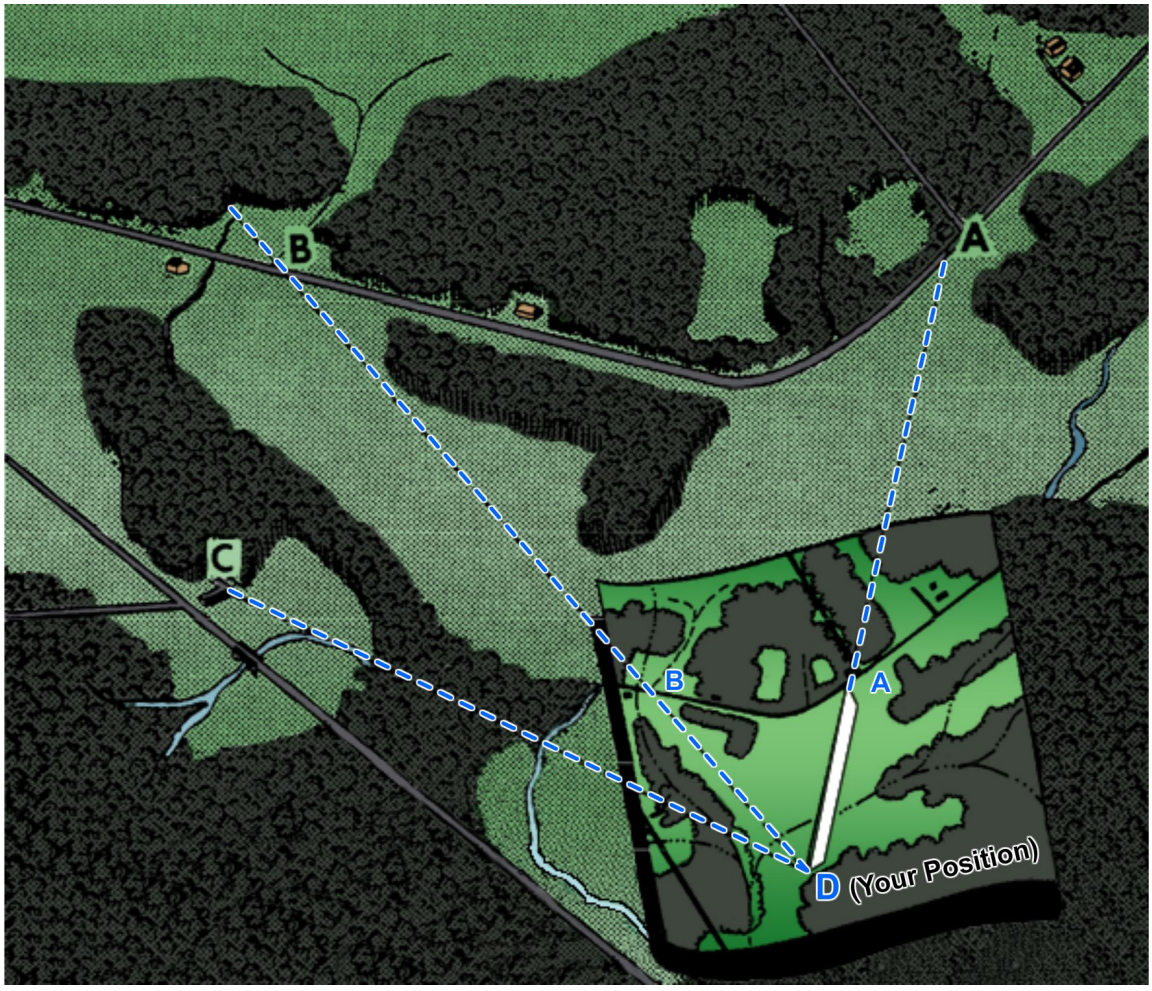


Figure 5-34 — Resection without a compass.

6.0.0 SKETCHES AND OVERLAYS

A Seabee should be able, if necessary, to make rough drawings of maps, field sketches, and overlays. The instruction presented in this chapter about maps is designed to assist in making rough drawings. The information below will be useful in

preparing a rough drawing of a field sketch or map overlay. The two types of sketches are panoramic and topographic.

6.1.0 Panoramic Sketches

A panoramic sketch is a picture of the ground or terrain. It shows the height and view from a personal point of observation. A panoramic sketch prepared by one scout may assist another scout in determining current position in the same location.

To make a panoramic sketch, use the following guidance:

1. First, determine the information to be conveyed.
2. Next, draw in the landscape lines that are more or less horizontal.
3. Show the main points of the area on the sketch.

Do not put in any unimportant details that might only be confusing, and do not show the foreground. Be sure to show the location of the information that is being conveyed.

4. Place any explanatory notes above the sketch with arrows pointing to the features explained.
5. The most prominent point in the sketch should be used as a reference point. After selecting this point, indicate the azimuth reading used to locate it.
6. Place a title on the sketch, show where it was prepared, and indicate the date and the time it was made; then sign it.

6.2.0 Topographic Sketches

A topographic sketch is prepared so the person receiving it can plot on a map of scouting positions or other important information. To prepare a topographic sketch, a map similar to one being used by the recipient of the information is needed.

1. Read current azimuth position to the position of an object easily seen and described.
2. Estimate the distance, using the most accurate means available.
3. Draw the azimuth line from current position to the object.
4. Then mark the azimuth above this line and the distance below this line.
5. At the proper end of the line, indicate the object.
6. At the other end of the line, indicate current position.
7. Find the azimuth and the distance to some other point on the map or to the position of the command post.
8. Draw this line on the sketch. Then indicate the azimuth, the distance, and the object to which it is drawn.
9. Finally, sign the sketch.

6.3.0 Map Overlays

A map overlay is generally used to send back reconnaissance information. The overlay is made by placing a piece of transparent paper on a map, marking the location, and numbering the corners of the grid squares. At least two corners should be marked or crossed. These crosses are called REGISTER MARKS and are used to orient the overlay on a map later on. After the register marks have been made, only write the

information that is to be sent back to the command post. When the overlay is received it will be placed on a similar map and oriented by its register marks and the information recorded on it.

Summary

In this chapter you learned about the different types of maps and the tools used to effectively utilize them. It is imperative that as a Seabee you know how to use them in order to lead your fellow Seabees to the correct areas. Remember, not knowing how to use a map and compass can lead you right into enemy hands.

Assignment 5

Objectives

1. Describe the principles of terrain appreciation.
2. Explain the aspects of weather, climate, and seasons as they influence the terrain.
3. Identify those qualities known as the military aspects of terrain that can be used by each unit leader in the employment of their forces and weapons.
4. Locate a point on a map when given the references.
5. Locate an object on a map utilizing the grid system.
6. Determine how contour lines are used for indicating elevation and relief on military maps.
7. Describe how direction and base lines are used in the preparation of military maps.
8. Identify topographic and military features represented on military maps as symbols.
9. Describe the components and the use of the lensatic compass, in relation to determining an azimuth, back azimuth, intersections, and resections.
10. Identify steps in drawing sketches and describe ways to properly register a map overlay.

Questions

1. During a military operation, what technique is used to analyze an area to determine how features of the land can be used?

    1. Terrain components
    2. Terrain appreciation
    3. Intelligence reporting
    4. Reconnaissance

2. What aspect of terrain is considered the most important from a tactical standpoint?

    1. Season
    2. Climate
    3. Weather
    4. Water

3. What elements can be used to restrict air support during a combat situation?

    1. High or low temperature
    2. Fog, rain, or a large mass of low-flying clouds
    3. High or low humidity
    4. First or second quarter of the moon

4. When you hold the key terrain in an area, what advantage do you have over the enemy?

    1. Patrol areas
    2. Cover
    3. Concealment
    4. Fields of fire and observation

5. A primary consideration when choosing a defensive position is to ensure the position provides _____

    1. Minimum observation and short fields of fire.
    2. Maximum observation and short fields of fire.
    3. Maximum observation and long fields of fire.
    4. Minimum observation and long fields of fire.

6. What is an artificial obstacle that can be used to slow troop movement through an area you are defending?

    1. Swamp
    2. Gully
    3. Cut and fills
    4. High ground

7. The principal digits of a grid number on a military map enable the map reader to determine _____

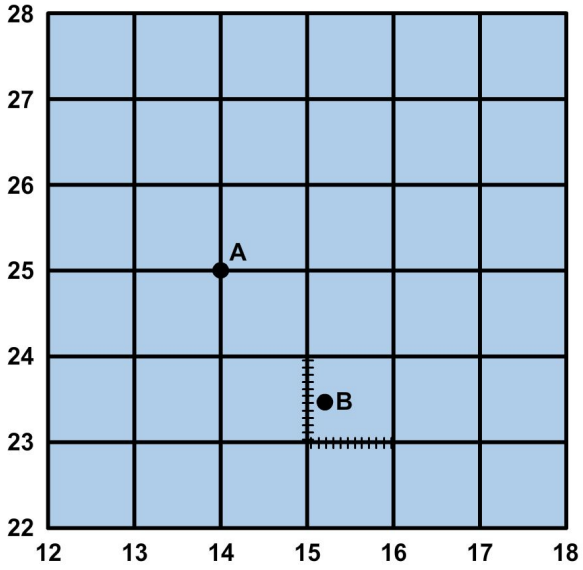
    1. precise angles.
    2. elevations between contour lines.
    3. referencing points.
    4. precise distances.

8. What is the correct method for writing a grid coordinate?

    1. 35°E, 71°N
    2. 3571
    3. 14250
    4. 71°N, 35°E

9. In the picture to the right, what are the grid coordinates of Point A?

    1. 140250
    2. 14250
    3. 2514
    4. 2541



10. In the picture to the right, what are the grid coordinates of Point B?

    1. 1523
    2. 152234
    3. 234152
    4. 230150

11. What is used to represent elevations on a map?

    1. Contour lines
    2. Grids
    3. Planimeter lines
    4. Meridians and parallels of latitude

12. What type of contour line is a heavy line with an elevation inserted within it?

    1. Index
    2. Supplementary
    3. Precise
    4. Intermediate

13. When you subtract half the contour interval from the elevation of the lowest contour line around a depression, what information is obtained?

    1. Estimated elevation at the top of the depression
    2. Estimated elevation at the bottom of the depression
    3. Mean sea level at the bottom of the depression
    4. Average sea level at the top of the depression

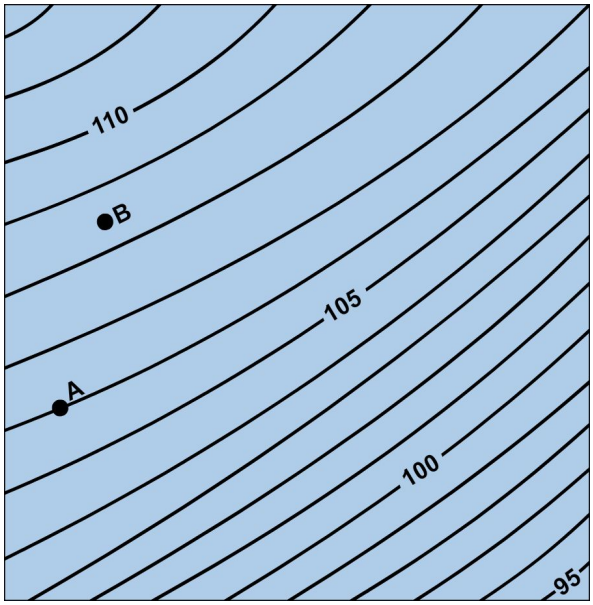
14. Where on a map can you find the value of the interval between supplementary contour lines?

    1. In a contour relief note on the map relief
    2. In a note on the map margin
    3. Alongside an index contour line
    4. Alongside the dashed-brown contour lines

15. What color is used to show the elevation value of a bench mark on a military map?

    1. Red
    2. Blue
    3. Black
    4. Brown

16. In the picture to the right, what is the approximate elevation, in feet, of Points A and B?



1. A, 106; B, 105
2. A, 107; B, 105.5
3. A, 106; B, 108.5
4. A, 105; B, 110

17. In the picture to the right, the area between what two contour lines are the flattest?

1. 95 and 100
2. 100 and 105
3. 105 and 110
4. 110 and 115

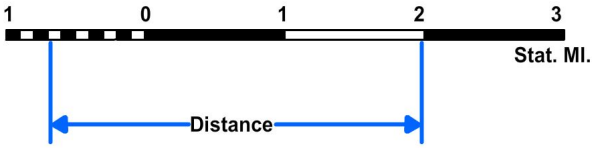
18. When contour lines are united on a map to show an extremely steep slope, what type of contour is used to indicate the slope?

1. Intermediate
2. Index “extreme”
3. Supplementary
4. Ticked “carrying”

19. What two basic types of scales are used on military maps?

1. Graphic and linear
2. Graphic and ratio
3. Linear and ratio
4. Graphic and orthographic

20. In the picture to the right, what is the distance, in miles, between Points A and B?



1. 1.3
2. 1.7
3. 2.3
4. 2.7

21. The scale of a map is 1/5000 and the distance between two points on the map is 2.4 inches. What is the distance, in feet, on the ground between these two points?

1. 240
2. 420
3. 1,000
4. 2,000

22. What land navigation terms are considered to be base lines for expressing directions on a map?

1. True north, grid north, and magnetic north
2. Greenwich meridian and International Date Line
3. Parallels of latitude and meridians of longitude
4. Datum plane, index contour, and bench mark

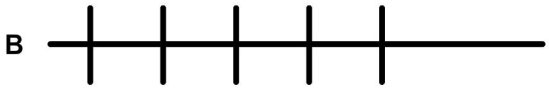
23. In the picture to the right, what is A?

1. Hill
2. Single track railroad
3. Fence
4. Road



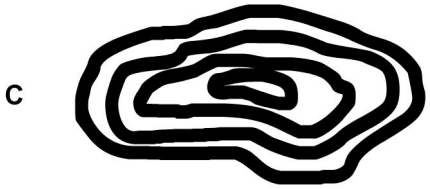
24. In the picture to the right, what is B?

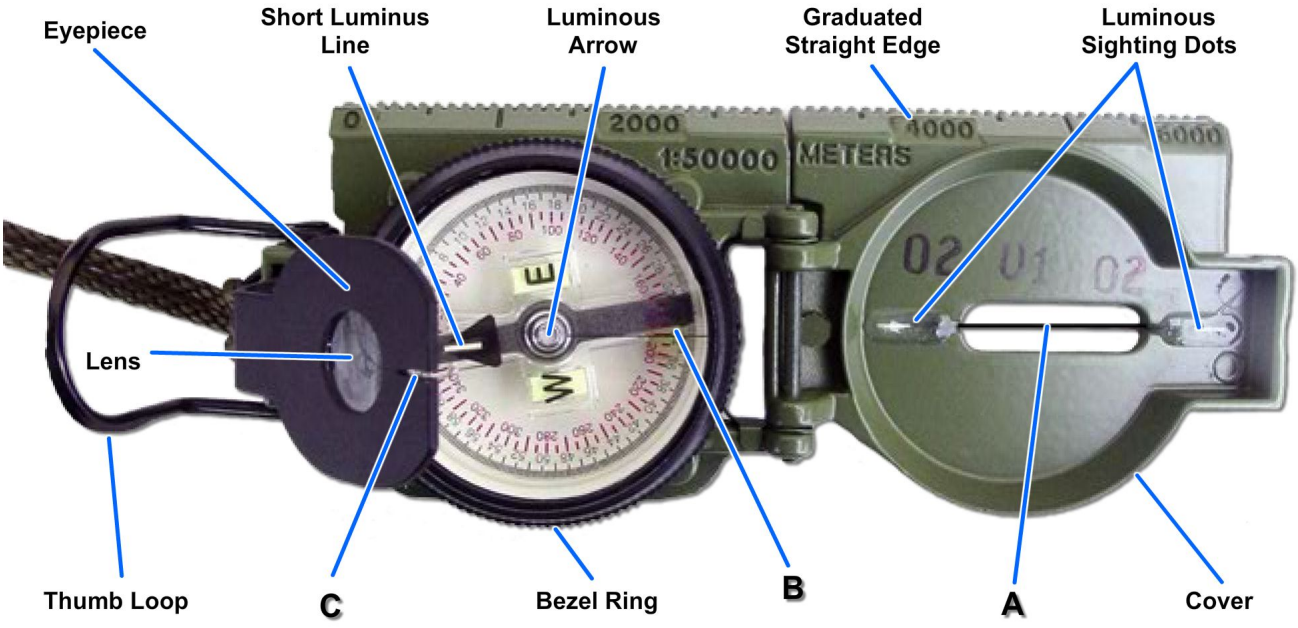
1. Hill
2. Single track railroad
3. Fence
4. Road



25. In the picture to the right, what is C?

1. Hill
2. Single track railroad
3. Fence
4. Road





26. In reference to the above picture, what is A?

1. Lens
2. Sighting wire
3. Index line
4. Sighting slot

26. In reference to the above picture, what is B?

1. Lens
2. Sighting wire
3. Index line
4. Sighting slot

27. In reference to the above picture, what is C?

1. Lens
2. Sighting wire
3. Index line
4. Sighting slot

28. What is the symbol for true north on a military map?

1. 
2. TN
3. ☆
4. Y

29. When sighting on an object and reading an azimuth, how is the horizontal angle measured?

1. Counterclockwise from a south base line
2. Clockwise from a north base line
3. Counterclockwise from a north base line
4. Clockwise from a south base line

30. How many counterclockwise clicks of the bezel ring are required for an azimuth of 72 degrees?

1. 18
2. 24
3. 36
4. 72

31. What device is used to measure the azimuth angle accurately?

1. Compass
2. Protractor
3. Straightedge
4. Ruler

32. A given direction can be expressed as a true azimuth only if it is measured _____.

1. on a military map
2. by a compass
3. from a meridian of longitude
4. along a line of latitude

33. What is the back azimuth to a target if the forward azimuth is 130 degrees?

1. 292 degrees
2. 310 degrees
3. 1850 mils
4. 6400 mils

34. What method should you use to locate a feature **NOT** defined on your map?

1. Intersection
2. Resection
3. Bypass
4. Introspection

35. What term is applied to locating your unknown position by sighting on two or more positions?

1. Intersection
2. Resection
3. Map overlay
4. Bypass

36. What is the final step in making a panoramic sketch?

1. Title it
2. Sign it
3. Date it
4. Reference it

37. When preparing a topographic sketch, where should you show the distance after drawing the azimuth line from your position to the sighted object?

1. On the marginal notes
2. Above the azimuth line
3. Below the azimuth line
4. At the end of the azimuth line

38. When making an overlay on a map to correctly orient it, what is the minimum number of corners on a grid square that should be marked?

1. 1
2. 2
3. 3
4. 4

ASSIGNMENT 5

Land Navigation

Directions: Select the correct answer from the list of alternates below each question in the end of chapter assignment. Write in the answer next to the corresponding question number below. Use this answer sheet as a reference to completing the online assignment related to this assignment.

1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	
12.	
13.	

14.	
15.	
16.	
17.	
18.	
19.	
20.	
21.	
22.	
23.	
24.	
25.	
26.	

27.	
28.	
29.	
30.	
31.	
32.	
33.	
34.	
35.	
36.	
37.	
38.	
39.	

Additional Resources and References

This chapter is intended to present thorough resources for task training. The following reference works are suggested for further study. This is optional material for continued education rather than for task training.

Map Reading and Land Navigation, U.S. Army Field Manual, FM 3-25.26.

Scouting and Patrolling, U.S. Marine Corps, MCWP 3-11.3.

Trainee Feedback

Center for Seabees and Facilities Engineering (CSFE) makes every effort to keep their courses up-to-date and free of technical errors. If you have a suggestion, found an error or inaccuracy, please write, FAX or email us by using the form below. Use one form for each comment and be sure to fill in the information as accurately and detailed as possible. Thank you for your assistance.

Write: CSFE
NCF Training Division (N7B)
3502 Goodspeed St.
Port Hueneme, CA 93043-4337

FAX: (805) 982-5508 / DSN 551-5508

E-mail: CSFE_CBCH@navy.mil

Trainee Feedback Form

Course: Seabee Combat Handbook, Volume ____, NAVEDTRA: _____

Course Date: _____ Chapter Number: _____ Page: _____

Paragraph: _____ Sentence: _____ Figure: _____ Frame/View: _____

Description: _____
_____
_____
_____
_____
_____

(optional) Corrective action: _____
_____
_____

(optional) Supporting reference(s): _____
_____

Your email address, if a response is requested: _____

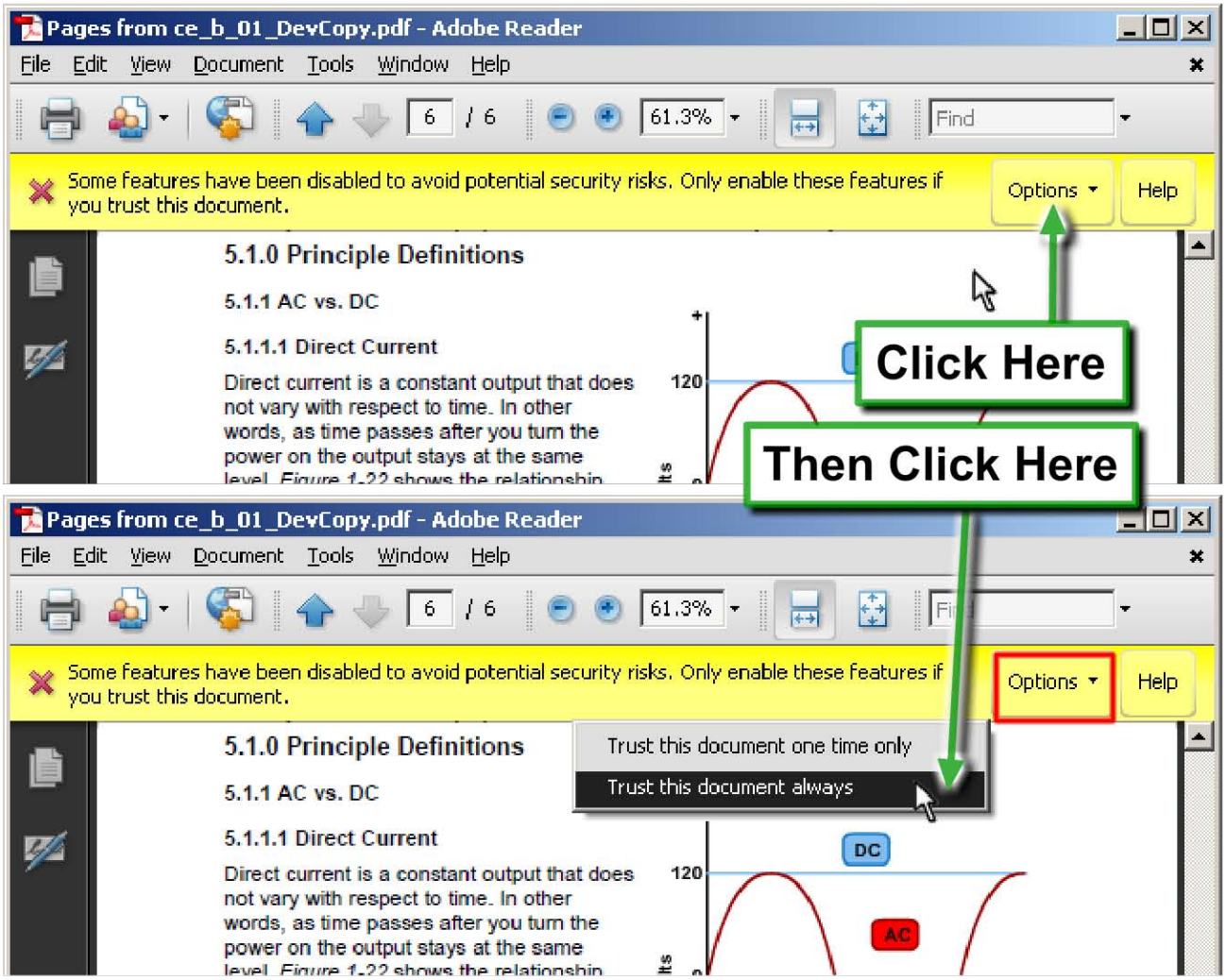
The Interactive features of this manual are currently disabled.

Many graphics will not appear correctly unless these features are turned on. You should either see a popup window, or a yellow banner at the top of the application. To enable the Interactive features of this manual follow the steps illustrated below:

If you see a popup window do the following:



If you see a yellow banner, do the following:



Once you have completed either of the above procedures the features will be enabled for this document, and this warning won't appear again after you leave this page.

Chapter 6

Evasion, Survival, Escape, and Recovery

Topics

1.0.0 Evasion

2.0.0 Survival

3.0.0 Escape

4.0.0 Personnel Recovery

To hear audio, click on the icon: 

Overview

The tactical need for greater individual and unit dispersion in warfare increases the possibility that your unit may be temporarily isolated from friendly forces. Experience shows this temporary isolation is fairly common and normal in both conventional warfare and counterinsurgency operations. For example, enemy action may cause relocation of adjacent units so you lose immediate contact with friendly forces; a sudden massing of guerrilla forces may isolate your unit in a guerrilla-controlled area; or as a member of a patrol operating in an enemy area, you may become separated from your patrol and find yourself alone or with a small group. If you do become isolated, you and your group or unit must still try to accomplish your assigned mission. After you complete your mission, your primary task is to rejoin friendly forces.

When you are isolated in an enemy area, your major problems are (1) avoid the enemy (Evasion), (2) the possibility of living in the field with limited equipment (Survival) until you can return to friendly forces, (3) the problem of escaping from the enemy if captured (Escape), and (4) your recovery.

This chapter contains information on the principles and techniques of evasion, survival, escape and recovery that have been used successfully worldwide. The information given here is by no means all-inclusive, but it should serve as an aid if the need arises.

Objectives

When you have completed this chapter, you will be able to:

1. Specify the travel and observation techniques for evading the enemy under given conditions.
2. Describe principles and techniques of survival for individuals or group leaders during evasion.
3. Identify the requirements and responsibilities of a group leader while the group is isolated behind enemy lines.
4. Specify survival techniques to be used while evading the enemy.
5. Explain different methods for a successful escape.
6. Describe actions required to maintain your health.

7. Describe personnel recovery procedures.

Prerequisites

There are no prerequisites for completing this manual.

Features of this Manual

This manual has several features which make it easy to use online.

- Figure and table numbers are italicized within the handbook text. Figure and table reference numbers are conveniently located next to (or near) the applicable handbook text.
- Audio and video clips are included in the text, with italicized instructions telling you where to click to activate the appropriate link.
- Review questions are included at the end of this chapter as the chapter assignment. To submit assignments log into https://www.courses.netc.navy.mil, go to “Student Services”, in the drop down click on “Active Courses”, go to "View/Submit Answers" next to the course you wish to submit answers for. Assignments may be submitted to the above Web site as they are completed, and instant scoring is available. Your completion letter is available as soon as you pass all assignments.
- A form at the end of each chapter allows your input for improving the manual or correcting errors to be brought to the attention of CSFE’s Technical Review Committee. Your input is important and will help keep this manual up to date and free of technical errors.

1.0.0 EVASION

1.1.0 Planning

The guidelines for a successful evasion include:

- Keeping a positive attitude.
- Using established procedures.
- Following your evasion plan of action.
- Being patient.
- Drinking water (do **NOT** eat food without water).
- Conserving strength for critical periods.
- Resting and sleeping as much as possible.
- Staying out of sight.

Odors that stand out and may give an evader away include but are not limited to the following:

- Scented soaps and shampoos.
- Shaving cream, after-shave lotion, or other cosmetics.
- Insect repellent (camouflage stick is least scented).
- Gum and candy (smell is strong or sweet).
- Tobacco (odor is unmistakable).

Where to go (initiate evasion plan of action):

- Near a suitable area for recovery.
- Selected area for evasion.
- Neutral or friendly country or area.
- Designated area for recovery.

1.1.1 Evasion Plan of Action (EPA) Format

Properly planning for the possible contingencies that may occur during a mission is a positive step toward being able to cope successfully with the changes in situation. The EPA is a critical document to an individual or to a unit faced with evading enemy forces. First, it is a plan that will provide evaders a starting point to begin operating effectively once evasion has begun. Second, it gives recovery forces the ability to know what the evaders are planning to do, thus making recovery operations easier. A well-thought-out EPA that everyone can understand is an important document to the evader.

NOTE

Upon deployment, you may carry with you the information compiled in A through E of the SITUATION paragraph **only**. Task organization (name and rank for each crew or team member)

1.1.1.1 Situation

A. Country Climatic Zones

- Tropical Rainy Climate
- Dry Climate
- Temperate Climate
- Cold Climate (wet/dry)
- Polar

B. Climatic Land Zones (whatever is applicable)

- Coasts—Seasons
  - Temperature
  - Precipitation
  - General wind direction
  - Cloud cover
- Plains (refer to coasts)
- Deserts (refer to coasts)
- Plateaus (refer to coasts)
- Mountains (refer to coasts)
- Swamps (refer to coasts)

C. Light Data (Beginning Morning Nautical Twilight (BMNT), End Evening Nautical Twilight (EENT), moonrise, moonset, percent of illumination)

D. Terrain

- Neighboring Borders
- General Terrain Zones
  - Coasts
    - General description and size
    - Vegetation
      - Natural
      - Tundra
      - Coniferous forest
      - Deciduous forest
      - Temperate grassland
      - Marshland swamp

        - Desert
        - Pastoral and arable land
        - Tropical forest
        - Savanna
        - Cultivated
        - Concealment (density)
        - Growing seasons
        - Edible
            - Food value
            - Procurement (young or mature)
            - Preparation
            - Cooking
        - Poisonous
        - Medical use
        - Other uses
    - Animals and fish
        - Domestic
            - Food value
            - Procurement
            - Preparation
            - Cooking
            - Medical use
            - Dangerous
            - Poisonous
            - Other uses
        - Wildlife (animals, fish, insects, and reptiles) (see domestic)
    - Water sources
        - Procurement
        - Potability
        - Preparation
- Plains (refer to coasts)
- Deserts (refer to coasts)
- Plateaus (refer to coasts)
- Mountains (refer to coasts)
- Swamps (refer to coasts)
- Rivers and lakes (refer to coasts)

- Natural Land Barriers
  - Mountain ranges
  - Large rivers

E. Civilian Population

- Numbers of Population
  - Totals and density (by areas)
  - Divisions of urban, suburban, rural, and nomads
- Dress and Customs
- Internal Security Forces
- Controls and Restrictions (explain)
- Border Area Security

F. Friendly Forces

- FEBA/FLOT
- Closest Units
- Location of Friendly or Neutral Embassies, Liaisons, Consulates
- Recovery Sites (explain), LZs en Route

G. Enemy Forces

- Doctrine
- Tactics
- Intelligence Reports
  - Identification
  - Location
  - Activity
  - Strength
  - Night-sighting devices

1.1.1.2 Mission—Conduct Avoidance of Capture on Order From -To

1.1.1.3 Execution (include planned routes and actions for ingress and egress)

1. **Overall Plan** (discuss actions for first 48 hours and actions after 48 hours)
   - When Do You Initiate Movement?
   - Location of Initial Movement Point
   - Actions at Initial Movement Point
   - Location of Hide Areas
   - Movement to Hide Areas
   - Actions around the Hide Sites
   - Movement to Hide Sites

- Actions at Hide Sites
  - Construction
  - Occupation
  - Movement out of hide site
- Location of Hole-up Areas
- Actions at Hole-up Areas
- Location of Recovery Site(s)

2. Other Missions

- Movement
  - Formation
  - Individual positions
  - Navigation
  - Stealth/listening
  - Security
    - Noise
    - Light
    - All-around security
  - Cover, concealment, and camouflage
  - Actions at breaks
    - Listening (5 to 10 minutes)
    - Long
  - Actions at danger areas (enemy observation or fire)
  - Actions for enemy sighting/contact
  - Rally points/rendezvous points
    - Locations
    - Actions
- Actions in the Care of Sick or Injured
  - Initial movement point
  - Along the movement route
- Actions for Crossing Borders
- Actions at Recovery Site(s)
- Other Actions
- Training and Rehearsals
- Inspections before Starting Movement

1.1.1.4 Service and Support

1. **Survival Aids**
    - Health
        - First aid
        - Disease
    - Water
        - Procurement
        - Purification
        - Carrying
    - Food
        - Procurement
        - Preparation
        - Cooking
        - Carrying
    - Shelter and Comfort/Warmth
    - Fire Starting
    - Recovery
    - Travel
2. **Survival Kit(s)**
3. **Special Equipment**
4. **Inspections**
    - Responsibilities
    - Equipment, Survival Items, and Kit(s)

1.1.1.5 Command and Signal

1. Chain of Command (list evasion team chain of command)
2. Signals (include mission number, aircraft or team call sign or identifier, crew or team position, type of aircraft, call sign suffix, and additional information as needed)
    - Frequencies
        - Primary
        - Alternate
    - Communication Schedule
        - Primary
        - Alternate
    - Codes
        - Letter of the week

- Number and word of the day
- SAR Dot
- Load signal
- Bona fides

1.2.0 Camouflage

Basic principles:

- Disturb the area as little as possible.
- Avoid activity that reveals movement to the enemy.
- Apply personal camouflage.

Camouflage patterns (*Figure 6-1*):

- Blotch pattern.
  - Temperate deciduous (leaf shedding) areas.
  - Desert areas (barren).
  - Snow (barren).



Figure 6-1 — Camouflage patterns.

- Slash pattern.
  - Coniferous areas (broad slashes).
  - Jungle areas (broad slashes).
  - Grass (narrow slashes).

Combination. May use blotched and slash together.

Personal camouflage application follows:

- Face. Use dark colors on high spots and light colors on any remaining exposed areas. Use a hat, netting, or mask if available.
- Ears. The insides and the backs should have two colors to break up outlines.
- Head, neck, hands, and the under chin. Use scarf, collar, vegetation, netting, or coloration methods.
- Light colored hair. Give special attention to conceal with a scarf or mosquito head net.

Position and movement camouflage follows:

- Avoid unnecessary movement.
- Take advantage of natural concealment:
  - Cut foliage fades and wilts, change regularly.
  - Change camouflage depending on the surroundings.
  - Do **NOT** select vegetation from same source.
  - Use stains from grasses, berries, dirt, and charcoal.
- Do **NOT** over camouflage.
- Remember when using shadows, they shift with the sun.
- Never expose shiny objects (like a watch, glasses, or pens).
- Ensure watch alarms and hourly chimes are turned off.
- Remove unit patches, name tags, rank insignia, etc.
- Break up the outline of the body, **"V"** of crotch/armpits.
- Conduct observation from a prone and concealed position.

1.3.0 Shelters

Use camouflage and concealment.

Locate carefully – easy to remember acronym: **BLISS**.

B - Blend

L - Low silhouette

I - Irregular shape

S - Small

S - Secluded location

- Choose an area
  - Least likely to be searched (drainages, rough terrain, etc.) and blends with the environment.
  - With escape routes (Do **NOT** corner yourself).
  - With observable approaches.
- Locate entrances and exits in brush and along ridges, ditches, and rocks to keep from forming paths to site.
- Be wary of flash floods in ravines and canyons.

- Conceal with minimal to no preparation.
- Take the direction finding threat into account before transmitting from shelter.
- Ensure overhead concealment.

1.4.0 Movement

1.4.1 Navigation

NOTE

Assess the threat and apply appropriate evasion principles.

1.4.1.1 Stay or Move

Stay with the vehicle/aircraft in a permissive environment.

Leave only when:

- Dictated by the threat.
- Certain of location, have a known destination, and the ability to get there.
- Water, food, shelter, and (or) help can be reached.
- Convinced rescue is not coming.

If you decide to travel, consider the following:

- Follow briefed evasion plan.
- Which direction to travel and why.
- What equipment to take, cache, or destroy.

Leave information at your start point (only in permissive environment):

- Destination.
- Route of travel.
- Personal condition.
- Supplies available.

Evasion considerations:

- Do not write on the map.
- Do not soil the map by touching the destination.

Do not fold in a manner providing travel information.

1.4.1.2 Navigation and Position Determination

Determine your general location:

- Develop a working knowledge of operational area:
    - Natural geographic checkpoints.
    - Manmade checkpoints.
    - Use the "Rate x Time = Distance" formula.
- Use previous knowledge of operational area.

- Use information provided in the map legend.
- Use prominent landmarks.
- Visualize map to determine position.

Determine cardinal directions (north, south, east, and west):

- Use compass.
- Stick and shadow method.
- Sunrise/moonrise in the east, sun/moonset in the west.
- Use a wristwatch to determine cardinal direction (Use this method for general direction only.)
- Stars

Route selection techniques:

- Circumnavigation: (*Figure 6-2*)
  - Find a prominent landmark on the opposite side of the obstacle.
  - Contour around obstacle to landmark.
  - Resume your route of travel.
- Dogleg (*Figure 6-3, frame 1*) and 90 degree offset (*Figure 6-3, frame 2*).
- Straight-line heading:
  - Maintain heading until reaching destination.
  - Open terrain, 1200 paces per mile (average) or 600 per kilometer (60 per 100 meters).
  - Rough terrain, 1800 paces per mile (average) or 900 per kilometer (90 per 100 meters).
  - One pace is every time the same foot touches ground.
- Deliberate offset:
  - Used when finding a point on a linear feature (i.e. road or river).
  - Intentionally navigate to left or right of target so you know which way to turn at the linear feature.
- Point-to-point:
  - Same as straight line.
  - Pick out landmarks on the heading and walk the trail of least resistance to a point.

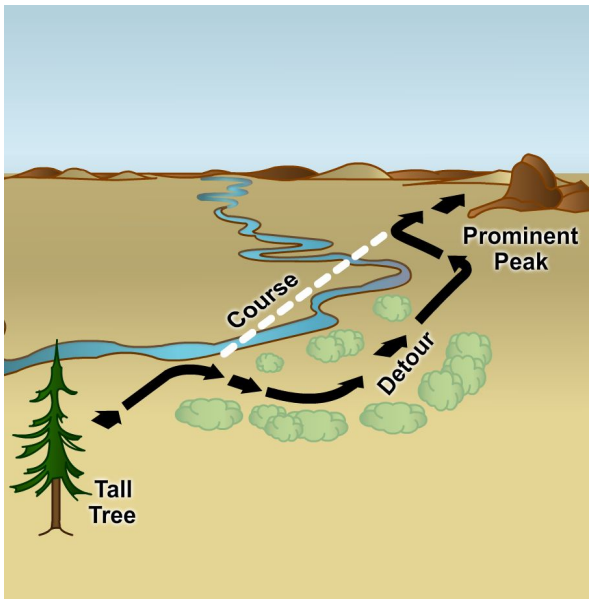


Figure 6-2 — Circumnavigation.

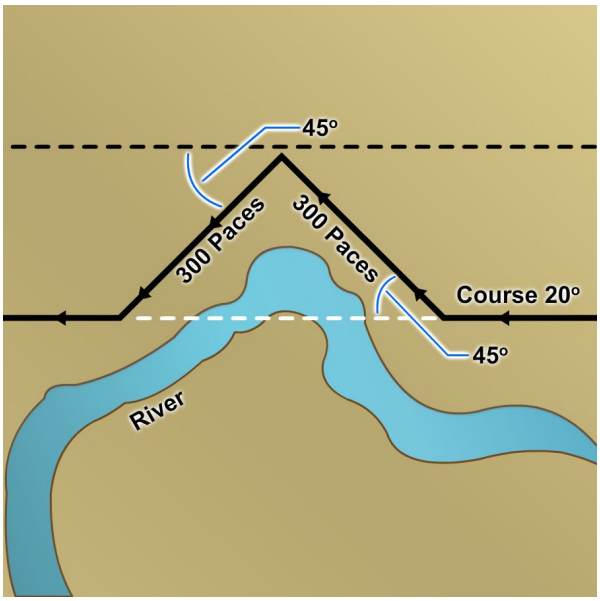


Figure 6-3 — Dogleg and 90 degree offset.

Interaction Available

- On reaching a point, establish another landmark and continue.

1.4.2 Travel

- Pick the easiest and safest route (unless evading).
- Maintain a realistic pace. Take rest stops when needed.
- Avoid overdressing and overheating.
- Consider food and water requirements.
- Take special care of feet.
- Pack equipment to prevent loss, damage, pack imbalance, and personal safety.
- Go around obstacles, not over or through them.
- Travel on trails whenever possible (non-tactical).
- Travel in forested areas if possible.
- Avoid creek bottoms and ravines with no escape in case of heavy rains.
- Swamps, lakes and unfordable rivers:
  - Swamps, lakes, and bogs may have to be circumnavigated.
  - Travel downstream to find people and slower water.
  - Travel upstream to find narrower and shallow water.

1.4.2.1 River Travel

River travel may be faster and save energy when hypothermia is not a factor. May be a primary mode of travel and LOC in a tropical environment, use with caution if evading.

In shallow water, use a pole to move the raft.

In deep water, use an oar.

Stay near inside edge of river bends (current speed is less).

Keep near shore.

Watch for dangers:

- Snags.
- Sweepers (overhanging limbs and trees).
- Rapids.
- Waterfalls.

Do not attempt to shoot the rapids.

When crossing a river or large/deep stream, use a raft.

Consider water depth before crossing without a flotation device.

1.4.2.2 Ice and Snow Travel

Travel should be limited to areas free of hazards.

Do not travel in:

- Blizzards.

- Bitterly cold winds.
- Poor visibility.

Obstacles to winter travel:

- Be aware of reduced daylight hours.
- Deep soft snow; if movement is necessary, make snowshoes
- Travel is easier in early morning or late afternoon near dusk when snow is frozen or crusted.

Avoid avalanche prone areas:

- Slopes 30-45 degrees or greater.
- Trees devoid of uphill branches (identifies prior avalanches).
- Heavy snow loading on ridge tops.

If caught in an avalanche:

- Backstroke to decrease burial depth.
- As snow slows down move hands around face to create air pocket.

Frozen water crossings:

- Weak ice should be expected where:
  - Rivers are straight.
  - Objects protrude through ice.
  - Snow banks extend over the ice.
  - Rivers or streams come together.
  - Rising water vapor indicates open or warm areas.
- Air pockets form when a frozen river loses volume.

When crossing, distribute your weight by laying flat, belly crawling, or using snowshoes.

Glacier travel is hazardous and should be avoided.

1.4.2.3 Mountainous Travel

Avoid ridge tops during storms (lightning hazard).

Rock avalanches and mudslides.

Avoid low areas (flash flood hazard).

1.4.2.4 Summer Travel

Dense brush:

- Travel on trails when possible (non-tactical).
- Travel in forested areas if possible.
- Avoid creek bottoms and ravines with no escape in case of heavy rains.

Swamps, lakes and unfordable rivers:

- Swamps, lakes, and bogs may have to be circumnavigated.

- Travel downstream to find people and slower water.
- Travel upstream to find narrower and shallow water.

1.4.2.5 Dry Climates Travel

Do not travel unless certain of reaching the destination using the water supply available.

When the days are hot, travel at dawn or dusk.

Follow the easiest trail possible (non-tactical), avoiding:

- Deep sandy dune areas.
- Rough terrain.

If a sandstorm occurs:

- Mark your direction of travel.
- Sit or lie down in direction of travel.
- Try to get to the downwind side of natural shelter.
- Cover the mouth and nose with a piece of cloth.
- Protect the eyes.
- Remain stationary until the storm is over.

In sand dune areas:

- Follow hard valley floor between dunes.
- Travel on the windward side of dune ridges.

1.4.2.6 Tropical Climates Travel

Travel only when it is light.

Avoid obstacles like thickets and swamps.

Part the vegetation to pass through.

Do not climb over logs if you can go around them.

Avoid grabbing vegetation, it may have spines or thorns (use gloves if possible).

Find trails:

- Where two streams meet.
- Where a low pass goes over a range of hills.

While traveling trails:

- Do not follow closed trails, they may lead to animal traps.



Figure 6-4 — Ground movement.

- Watch for disturbed areas on game trails, they may indicate a pitfall or trap.
- Do not sleep on a game trail.
- Use a walking stick to probe for pitfalls or traps.

1.4.3 Movement Techniques

A moving object is easy to spot. If travel is necessary:

- Mask with natural cover (*Figure 6-4*).
- Use the military crest.
- Restrict to periods of low light, bad weather, wind, or reduced enemy activity.
    - Avoid silhouetting (*Figure 6-5*).
- At irregular intervals:
    - **STOP** at a point of concealment.
    - **LOOK** for signs of human or animal activity (smoke, tracks, roads, troops, vehicles, aircraft, wire, buildings, etc.). Watch for trip wires or booby traps and avoid leaving evidence of travel. Peripheral vision is more effective for recognizing movement at night and twilight.
    - **LISTEN** for vehicles, troops, aircraft, weapons, animals, etc.
    - **SMELL** for vehicles, troops, animals, fires, etc.



Figure 6-5 — Avoid silhouetting.

- Employ noise discipline; check clothing and equipment for items that could make noise during movement and secure them.

Break up the human shape or recognizable lines.

Route selection requires detailed planning and special techniques (irregular route/zigzag) to camouflage evidence of travel.

Some techniques for concealing evidence of travel follows:

- Avoid disturbing the vegetation above knee level.
- **DO NOT** break branches, leaves, or grass.
- Use a walking stick to part vegetation and push it back to its original position.

- **DO NOT** grab small trees or brush. (This may scuff the bark or create movement that is easily spotted. In snow country, this creates a path of snowless vegetation revealing your route.)
- Pick firm footing (carefully place the foot lightly but squarely on the surface to avoid slipping). Try **NOT** to:
  - Overturn ground cover, rocks, and sticks.
  - Scuff bark on logs and sticks.
  - Make noise by breaking sticks. (Cloth wrapped around feet helps muffle this.)
  - Mangle grass and bushes that normally spring back.
- Mask unavoidable tracks in soft footing by -
  - Placing tracks in the shadows of vegetation, downed logs, and snowdrifts.
  - Moving before and during precipitation allows tracks to fill in.
  - Traveling during windy periods.
  - Taking advantage of solid surfaces (logs, rocks, etc.) leaving less evidence of travel.
  - Patting out tracks lightly to speed their breakdown or make them look old.
- Secure trash or loose equipment – hide or bury discarded items. (Trash or lost equipment identifies who lost it.)
- Concentrate on defeating the handler if pursued by dogs.

Penetrate obstacles as follows:

- Enter deep ditches feet first to avoid injury.
- Go around chain-link and wire fences. Go under fence if unavoidable, crossing at damaged areas. Do **NOT** touch fence; look for electrical insulators or security devices.
- Penetrate rail fences, passing under or between lower rails. If impractical, go over the top, presenting as low a silhouette as possible (*Figure 6-6, frame 1*).
- Cross roads after observation from concealment to determine enemy activity. Cross at points offering concealment such as bushes, shadows, bend in road, etc. Cross in a manner leaving your footprints parallel (cross step sideways) to the road. (*Figure 6-6, frame 2*)
- Use same method of observation for railroad tracks that was used for roads. Next, align body parallel to tracks with face down, cross tracks using a semi-pushup motion. Repeat for the second track. (*Figure 6-6, frame 3*).

WARNING

If 3 rails exist, 1 may be electrified.



Interaction Available

Figure 6-6 — Penetrating obstacles.

2.0.0 SURVIVAL

The experience of hundreds of Service members isolated during World War II, the Korean conflict, and the Vietnam conflict proved that survival is largely a matter of mental outlook. The will to survive is the deciding factor. Whether with a group or alone, people will experience emotional problems resulting from fear, despair, loneliness, and boredom. Also, the will to live is sure to be taxed by injury and pain, fatigue, hunger, and thirst. When not prepared mentally to overcome all obstacles and accept the worst, the chances of coming out alive are greatly reduced.

This section is based entirely on the keyword SURVIVAL. The letters in this word can help guide your actions in any survival situation. Learn what each letter represents and practice applying these guidelines when conducting survival training. Remember the word **SURVIVAL**. (*Figure 6-7*)

S	**Size Up the Situation, (*Surroundings, Physical Condition, Equipment)***
U	**Use All your Senses, Undue Haste Makes Waste**
R	**Remember Where You Are**
V	**Vanquish Fear and Panic**
I	**Acts Like the Natives**
V	**Value Living**
A	**Acts Like the Natives**
L	**Live by Your Wits, But for Now, Learn Basic Skills**

Figure 6-7 — Guidelines for survival.

2.1.0 Survival Actions

The following paragraphs expand on the meaning of each letter of the word survival. Study and remember what each letter signifies because some day you may have to make the word work for you.

S—SIZE UP THE SITUATION

If you are in a combat situation, find a place where you can conceal yourself from the enemy. Remember, security takes priority. Use your senses of hearing, smell, and sight to get a feel for the battlespace. Determine if the enemy is attacking, defending, or withdrawing. You will have to consider what is developing on the battlespace when you make your survival plan.

2.1.1Surroundings

Determine the pattern of the area. Get a feel for what is going on around you. Every environment, whether forest, jungle, or desert, has a rhythm or pattern. This tempo includes animal and bird noises and movements and insect sounds. It may also include enemy traffic and civilian movements.

2.1.2 Physical Condition

The pressure of the battle you were in or the trauma of being in a survival situation may have caused you to overlook wounds you received. Check your wounds and give yourself first aid. Take care to prevent further bodily harm. For instance, in any climate, drink plenty of water to prevent dehydration. If you are in a cold or wet climate, put on additional clothing to prevent hypothermia.

2.1.3 Equipment

Perhaps in the heat of battle, you lost or damaged some of your equipment. Check to see what equipment you have and what condition it is in.

Now that you have sized up your situation, surroundings, physical condition, and equipment, you are ready to make your survival plan. In doing so, keep in mind your basic physical needs—water, food, and shelter.

U—USE ALL YOUR SENSES, UNDUE HASTE MAKES WASTE

You may make a wrong move when you react quickly without thinking or planning. That move may result in your capture or death. Don’t move just for the sake of taking action. Consider all aspects of your situation before you make a decision and a move. If you act in haste, you may forget or lose some of your equipment. In your haste you may also become disoriented so that you don’t know which way to go. Plan your moves. Be ready to move out quickly without endangering yourself if the enemy is near you. Use all your senses to evaluate the situation. Note sounds and smells. Be sensitive to temperature changes. Always be observant.

R—REMEMBER WHERE YOU ARE

Spot your location on your map and relate it to the surrounding terrain. This basic principle is one that you must **ALWAYS** follow. If there are other persons with you, make sure they also know their location. Always know who in your group, vehicle, or aircraft has a map and compass. If that person is killed, you will have to get the map and compass from him. Pay close attention to where you are and where you are going. Do not rely on others in the group to keep track of the route. Constantly orient yourself. Always try to determine, as a minimum, how your location relates to the location of:

- Enemy units and controlled areas.
- Friendly units and controlled areas.
- Local water sources (especially important in the desert).

- Areas that will provide good cover and concealment.

This information will allow you to make intelligent decisions when you are in a survival and evasion situation.

V—VANQUISH FEAR AND PANIC

The greatest enemies in a combat survival and evasion situation are fear and panic. If uncontrolled, they can destroy your ability to make an intelligent decision. They may cause you to react to your feelings and imagination rather than to your situation. These emotions can drain your energy and thereby cause other negative emotions. Previous survival and evasion training and self-confidence will enable you to vanquish fear and panic.

I—IMPROVISE

In the United States (U.S.), we have items available for all our needs. Many of these items are cheap to replace when damaged. Our easy-come, easy-go, easy-to-replace culture makes it unnecessary for us to improvise. This inexperience in "making do" can be an enemy in a survival situation. Learn to improvise. Take a tool designed for a specific purpose and see how many other uses you can make of it.

Learn to use natural objects around you for different needs. An example is using a rock for a hammer. No matter how complete a survival kit you have with you, it will run out or wear out after a while. Your imagination must take over when your kit wears out.

V—VALUE LIVING

All of us were born kicking and fighting to live, but we have become used to the soft life. We have become creatures of comfort. We dislike inconveniences and discomforts. What happens when we are faced with a survival situation with its stresses, inconveniences, and discomforts? This is when the will to live— placing a high value on living—is vital. The experience and knowledge you have gained through life and your training will have a bearing on your will to live. Stubbornness, a refusal to give in to problems and obstacles that face you, will give you the mental and physical strength to endure.

A—ACT LIKE THE NATIVES

The natives and animals of a region have adapted to their environment. To get a feel of the area, watch how the people go about their daily routine. When and what do they eat? When, where, and how do they get their food? When and where do they go for water? What time do they usually go to bed and get up? These actions are important to you when you are trying to avoid capture.

Animal life in the area can also give you clues on how to survive. Animals also require food, water, and shelter. By watching them, you can find sources of water and food.

WARNING

Animals cannot serve as an absolute guide to what you can eat and drink. Many animals eat plants that are toxic to humans..

Keep in mind that the reaction of animals can reveal your presence to the enemy.

If in a friendly area, one way you can gain rapport with the natives is to show interest in their tools and how they get food and water. By studying the people, you learn to

respect them, you often make valuable friends, and, most important, you learn how to adapt to their environment and increase your chances of survival.

L—LIVE BY YOUR WITS, BUT FOR NOW, LEARN BASIC SKILLS

Without training in basic skills for surviving and evading on the battlespace, your chances of living through a combat survival and evasion situation are slight.

Learn these basic skills now,not when you are headed for or are in the battle. How you decide to equip yourself before deployment will affect whether or not you survive. You need to know about the environment to which you are going, and you must practice basic skills geared to that environment. For instance, if you are going to a desert, you need to know how to get water.

Practice basic survival skills during all training programs and exercises. Survival training reduces fear of the unknown and gives you self-confidence. It teaches you to live by your wits.

2.1.4 Pattern For Survival

Develop and change your survival pattern to meet your immediate physical needs as the environment changes to beat the enemies of survival. This survival pattern must include food, water, shelter, fire, first aid, and signals placed in order of importance. For example, in a cold environment, you would need a fire to get warm; a shelter to protect you from the cold, wind, and rain or snow; traps or snares to get food; a means to signal friendly aircraft; and first aid to maintain health. If you are injured, first aid has top priority no matter what climate you are in.

2.2.0 Group Survival

The entire squad, platoon, or group must make reactions to survival situations automatic. The best chance for survival belongs to the group that works together and has a leader who fulfills their responsibilities to the group. If the group remembers the factors in this section while evading capture, their return to friendly forces should be successful.

Group survival activities should be organized. Group survival depends largely upon the organization of its manpower. Organized action by group members that know what to do and when to do it, during ordinary circumstances and during a crisis, prevents panic. One technique for achieving organized action is to keep the group well informed. Another is to devise a plan and then stick to it.

Assigning each Seabee a task that fits their personal qualifications most closely is another way of organizing a group. If one Seabee feels they can fish better than cook, let them provide the fish. Always determine and use special skills of members within the group.

Panic, confusion, and disorganization are lessened by good leadership. It is the responsibility of the senior member of a group to assume command and establish a chain of command that includes all members of the group. Each Seabee should know their position in the chain of command and be familiar with the duties of every other Seabee; this is especially important to the senior member. Under no circumstances should leadership of the group be left up to chance acceptance by some member after a situation arises.

If senior, lead the group. Group survival is a test of effective leadership. Maintain respect for the leadership by using it wisely; be the leader; set the example. Watch out

constantly to prevent serious arguments. To keep troublemakers from attracting undue attention, to keep those who may “crack up” from disrupting the group, and to prevent carelessness caused by fatigue, hunger, and cold are important parts of the job. Know each other and be responsible for the welfare of each individual.

Develop a feeling of mutual dependence within the group by stressing that each Seabee depends on the other for survival. Emphasize that wounded or injured Seabees will not be left behind—that it is the responsibility of each member to see that the group returns intact. This attitude fosters high morale and unity. Each member receives support and strength from the others.

No matter what the situation, the leader must make the decisions. Because they need intelligence upon which to base their decisions, they should ask for information and advice from other members of the group—much as a General uses his staff. Above all else, the leader must always appear to be decisive.

Situations arise that must be acted upon immediately. The ability to think on the feet usually determines successful survival. The facts should be considered and decisions made rapidly.

2.3.0 Survival Techniques

According to the Code of Conduct for members of the Armed Forces, “It is your duty to evade capture by the enemy.” Also, “If captured, you must make every effort to escape.” Seabees are faced with the chance of being exposed to conditions that can force them into a life-or-death struggle. Survival, in this case, depends on the ability to apply the techniques of evading and escaping. This is an important reason for making survival techniques part of the basic combat skills.

People can remain alive anywhere in the world when they keep their wits. This is a major lesson in survival. Remember that nature and the elements are neither our friend nor the enemy. Instead, the determination to live and the ability to make nature work are the deciding factors.

The job is to get back. The more that is known about conditions peculiar to the region located, including the plant and animal life, the better the chances are for survival.

Survival in remote and desolate areas, in the Arctic, desert, or jungle, depends on the individual. The Seabee must be physically fit, have a fundamental knowledge of how to locate water, know what foods are available, and learn ways to find and prepare them. It is imperative to be able to recognize plants and animals that can harm the survivor.

2.3.1 Water

2.3.1.1 Water Requirements

Drink **extra** water. Minimum of 2 quarts per day to maintain fluid level. Exertion, heat, injury, or an illness increases water loss.

NOTE

Pale yellow urine indicates adequate hydration.

2.3.1.2 Water Procurement

Do **NOT** drink:

- Urine

- Fish juices
- Blood
- Sea water
- Alcohol
- Melted water from new sea ice

Water sources:

- Surface water (streams, lakes, and springs)

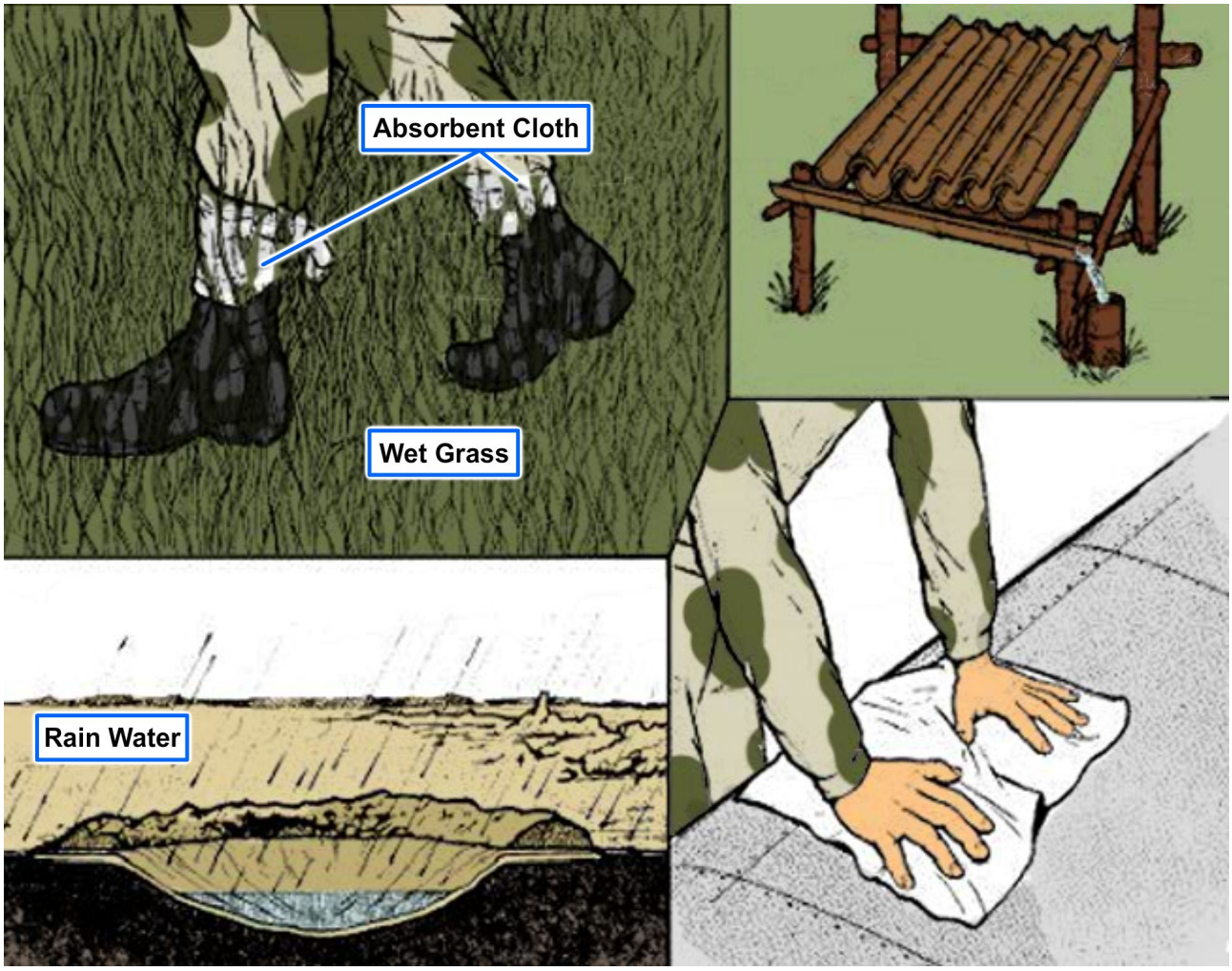


Figure 6-8 — Water procurement.

- Precipitation (rain, snow, dew, sleet) (*Figure 6-8*)
- Subsurface (wells and cisterns)
- Ground water (when no surface water is available) (*Figure 6-9*)
    - Abundance of lush green vegetation.

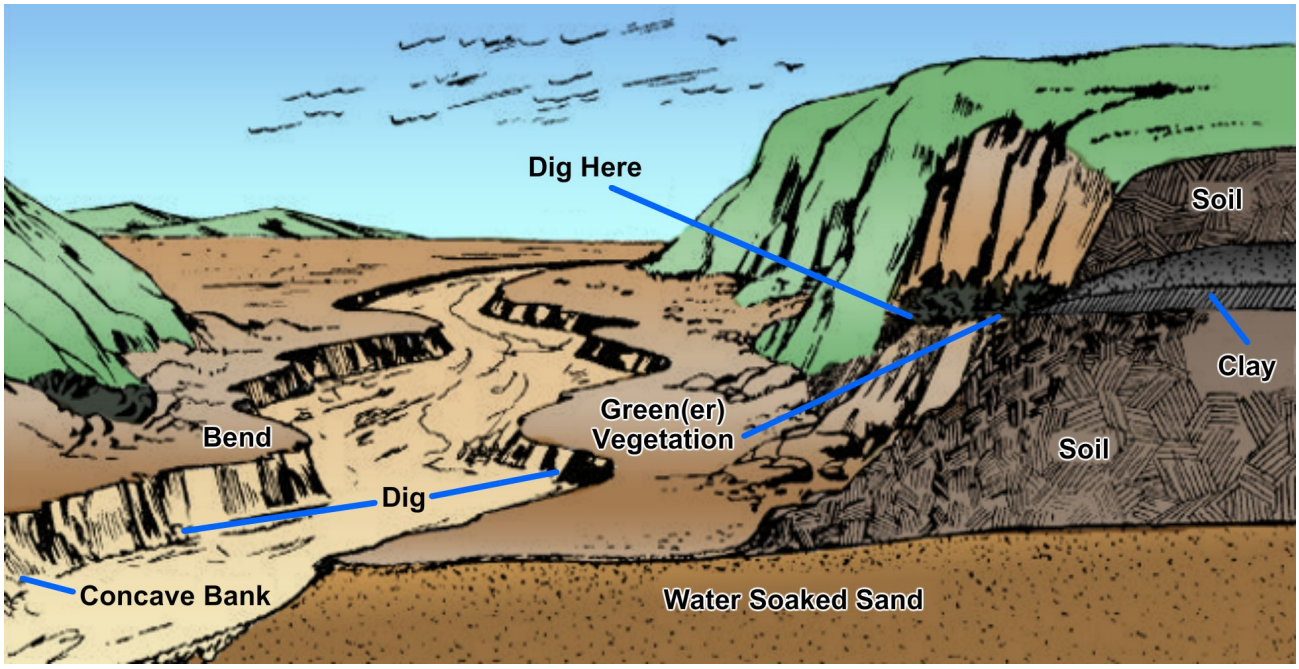


Figure 6-9 — Water indicators.

- Drainages and low-lying areas.
- **"V"** intersecting game trails often point to water.
- Presence of swarming insects indicates water is near.
- Bird flight in the early morning or late afternoon might indicate the direction to water.

Snow or ice:

- Do **NOT** eat ice or snow.
  - Lowers body temperature.
  - Induces dehydration.
  - Causes minor cold injury to lips and mouth.
- Melt with fire.
  - Stir frequently to prevent damaging container.
  - Speed the process by adding hot rocks or water.
- Melt with body heat.
  - Use waterproof container.
  - Place between layers of clothing.
  - Do **NOT** place next to the skin.
- Use a water generator (*Figure 6-10*).

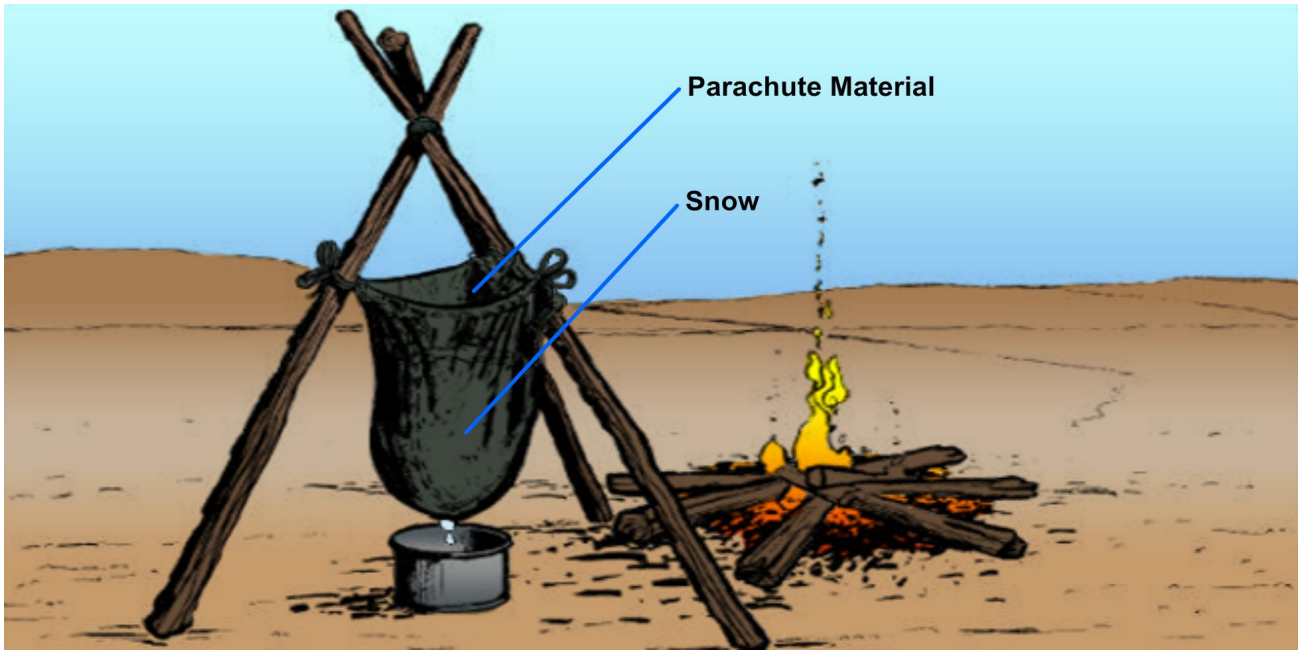


Figure 6-10 — Water generator.

Tropical areas.

- All open sources previously mentioned.
- Vegetation.
  - Plants with hollow sections can collect moisture.
  - Leaning Tree. Cloth absorbs rain running down tree and drips into container (Figure *6-11*).



Figure 6-11 — Leaning tree.

  - Banana plants.
  - Water trees (avoid milky sap) (*Figure 6-12*).

- Tap before dark. Let sap stop running and harden during the daytime.
- Produce most water at night.



Figure 6-12 — Water tree.

- For evasion situations, bore into the roots and collect water.

- Vines (*Figure 6-13*).
  - Not all vines yield palatable water, but try any vine found. Use the following method for tapping a vine. It works on any species.
    - Cut a deep notch in the vine as high up as you can reach (do **NOT** use milky sap).
    - Pour into hand to check smell, color, and taste to determine if drinkable.
    - If juice is clear and water like, cut as large a piece of vine as possible (cut the top first). Cut the vine off close to the ground and let the water drip into your mouth (*Figure 6-14*) or a container.
    - Do **NOT** touch vine to lips.
    - When the water ceases to drip, cut another section off the top.
    - Repeat this until the supply of fluid is exhausted.
  - Green bamboo.



Figure 6-13 — Water vines.



Figure 6-14 — Getting water from a vine.



Figure 6-15 — Getting water from bamboo.

-
  - Bore hole at bottom of section to obtain water. (*Figure 6-15*)

⚠ CAUTION ⚠

Liquid contained in green coconuts may cause diarrhea.

- Beach well. Along the coast, obtain water by digging a beach well (*Figure 6-16*).
  - Placed approximately 100 yards from the high water mark

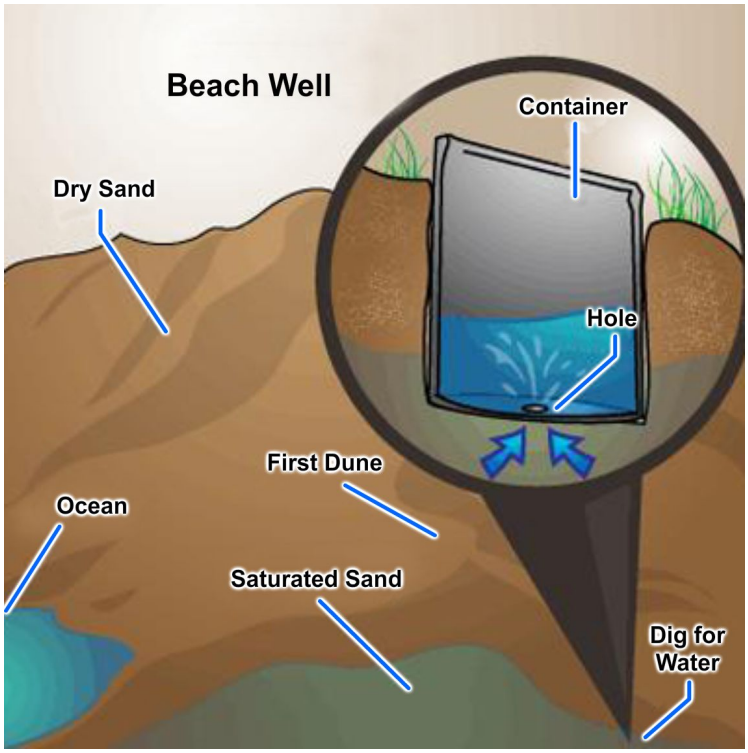


Figure 6-16 — Beach well.

Dry areas.

- Solar still (*Figure 6-17*).

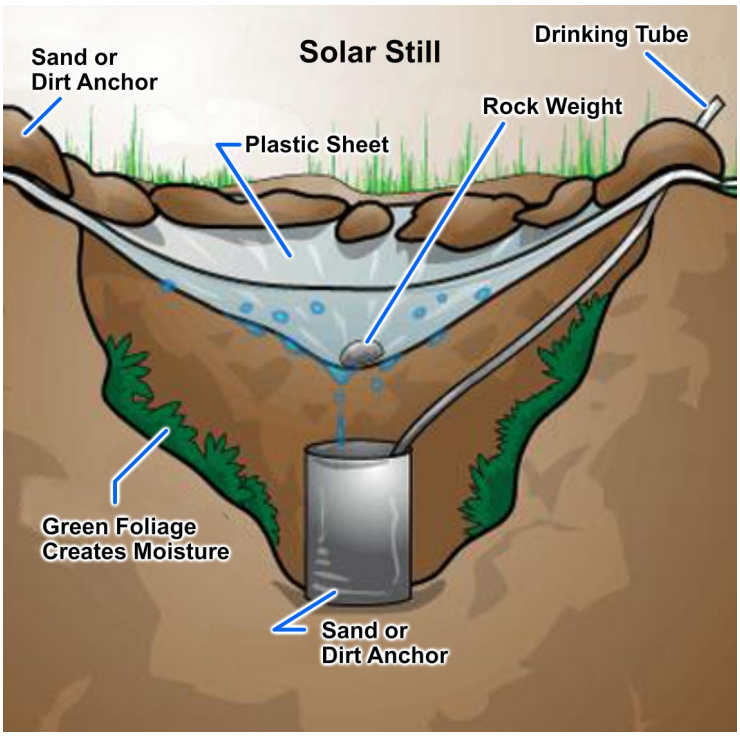


Figure 6-17 — Solar still.

- Vegetation bag (*Figure 6-18*).

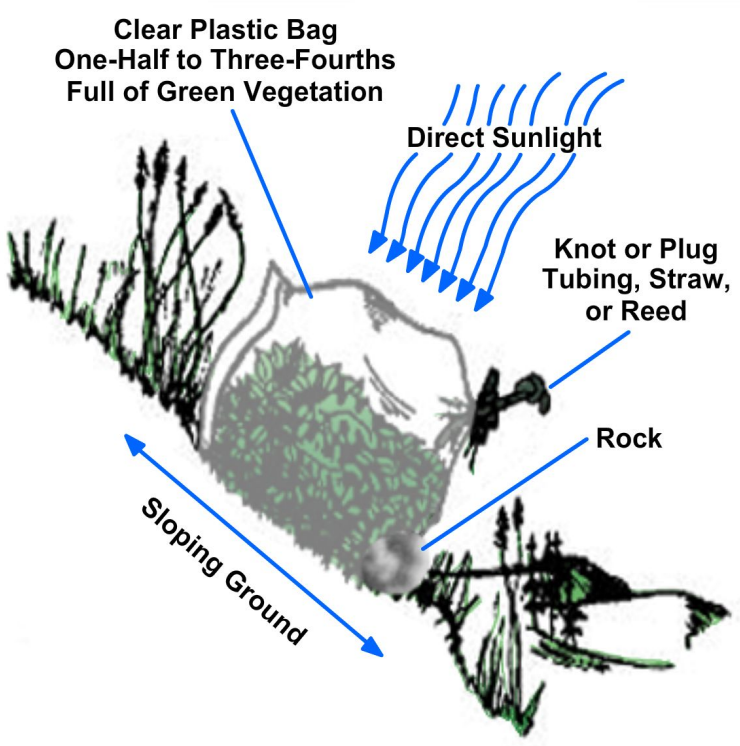


Figure 6-18 — Vegetation bag.

- Transpiration bag (*Figure 6-19*).
  - Water bag must be clear.
  - Water will taste like the plant smells.

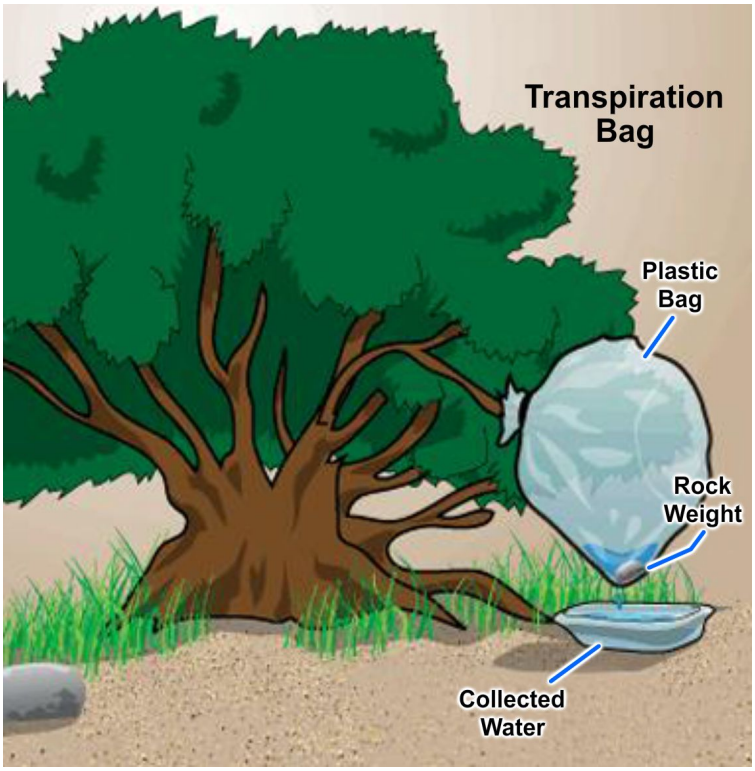


Figure 6-19 — Transpiration bag.

- Seepage basin (*Figure 6-20*).

⚠ CAUTION ⚠

Do **NOT** use poisonous/toxic plants in vegetation/ transpiration bags.

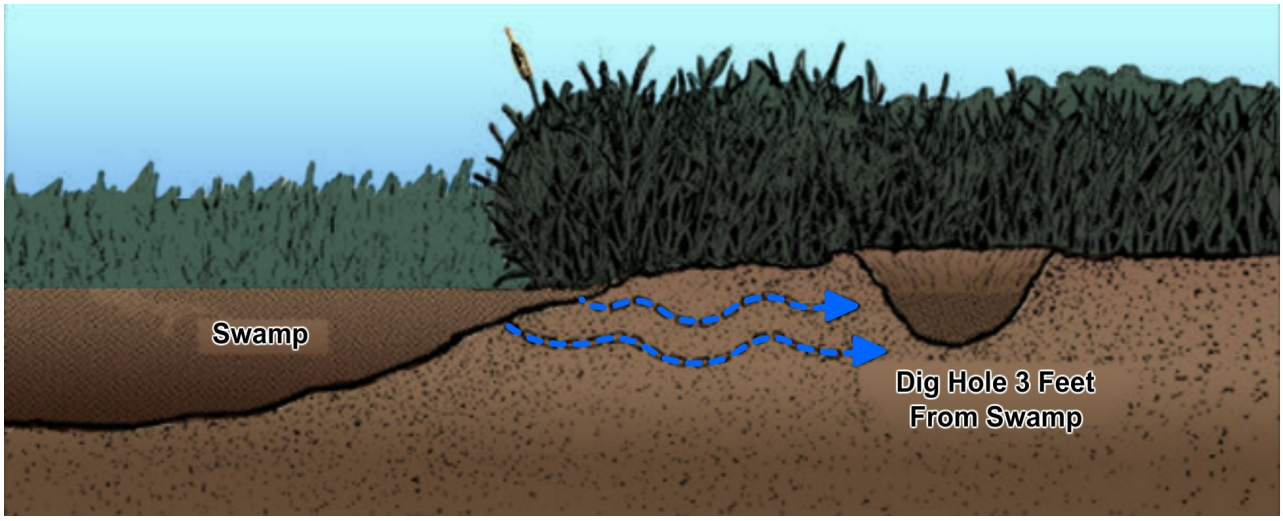


Figure 6-20 — Seepage basin.

2.3.2 Food

In a short time, it will be apparent that the second requirement is food. This is especially true during a survival episode when every ounce of energy is needed and endurance must be mustered.

Humans have been known to live for more than a month without food. But, unless in extremely difficult circumstances, there is little need to be deprived of something to eat. Nature can be a provider if the sources are known. Apply the following rules when isolated:

- Inventory rations and water. Estimate the length of time to be on your own.
- Divide food—two thirds for the first half of isolation and one third for the second half.
- Avoid dry, highly flavored foods and meats when there is less than 1 quart of water each day.
- Remember—eating requires water. Eat food high in carbohydrates such as hard candy and fruit bars.
- Keep strenuous work to a minimum. The less energy expended the less food and water required.
- Eat regularly when possible; do not nibble. Plan one good meal each day and cook it if possible. Cooking makes food safer, more digestible, and palatable. Also, the time spent cooking gives a rest period or a time to relax.
- Always be on the lookout for wild food. With few exceptions, everything seen that walks, crawls, swims, or grows from the soil is edible. Learn to live off the land.

2.3.2.1 Food Procurement

Sources and location.

- Mammals can be found where:
  - Trails lead to watering, feeding, and bedding areas.
  - Droppings or tracks look fresh.
- Birds can be found by:
  - Observing the direction of flight in the early morning and late afternoon (leads to feeding, watering, and roosting areas).
  - Listening for bird noises (indication of nesting areas
- Fish and other marine life locations (*Figure 6-21*).

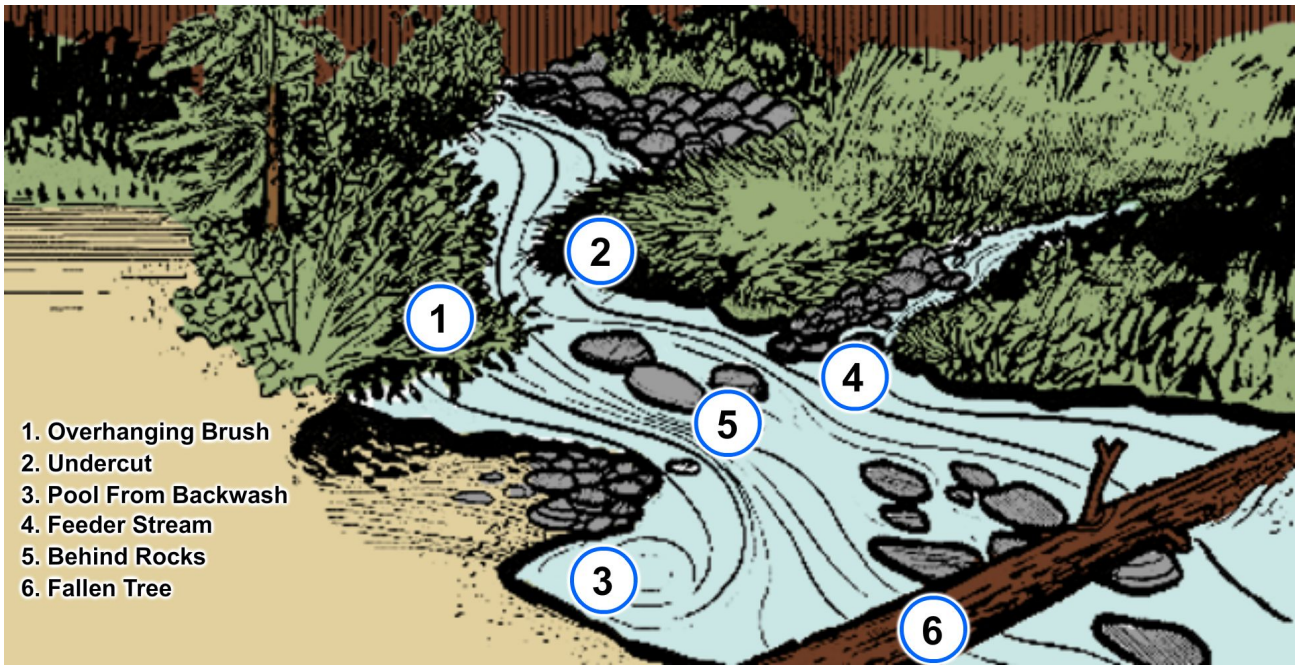


Figure 6-21 — Fishing locations.

- Reptiles and amphibians are found almost worldwide.
- Insects are found:
  - In dead logs and stumps.
  - At ant and termite mounds.
  - On ponds, lakes, and slow moving streams.

Procurement techniques.

- Snares:
  - Work while unattended.
  - Location:
    - Trails leading to water, feeding, and bedding areas.
    - Mouth of dens (*Figure 6-22*).
  - Construction of simple loop snare.
    - Use materials that will not break under the strain of holding an animal.
    - Use a figure 8 (locking loop) if wire is used (*Figure 6-23, frame 1*).



Figure 6-22 — Snare placement.

        - Once tightened, the wire locks in place, preventing reopening, and the animal's escape.
    - To construct a squirrel pole (*Figure 6-23, frame 2*) use simple loop snares.
    - Make noose opening slightly larger than the animal's head (3-finger width for squirrels, fist-sized for rabbits).
  - Placement of snares (set as many as possible).
    - Avoid disturbing the area.
    - Use funneling (natural or improvised*) (Figure 6-23, frame 3*).

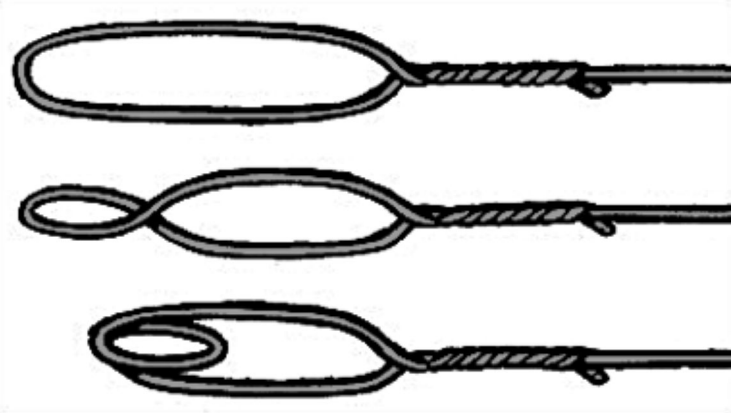


Figure 6-23 — Types of snares.

- Noose stick (easier and safer to use than the hands).
- Twist stick (*Figure 6-24*).
  - Insert forked stick into a den until something soft is met.
  - Twist the stick, binding the animal's hide in the fork.
  - Remove the animal from the den.
  - Be ready to **KILL** the animal; it may be dangerous.

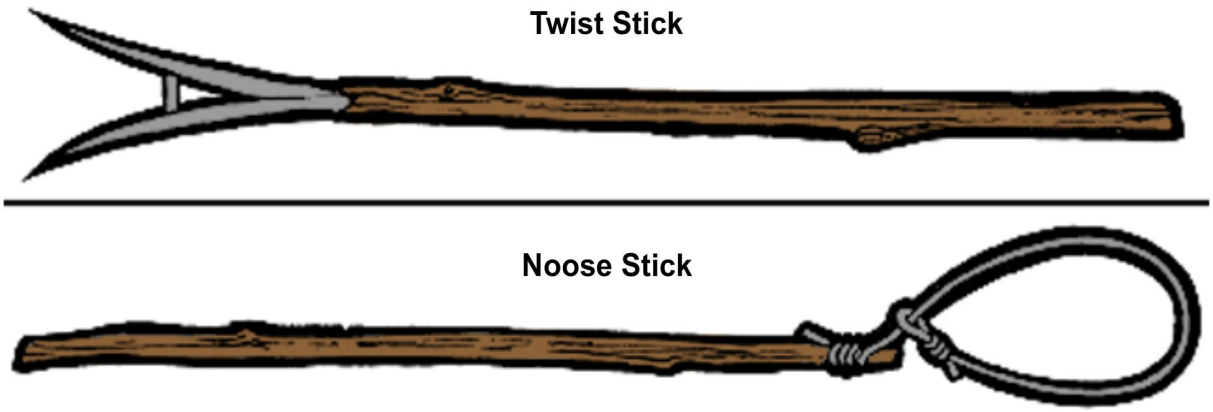


Figure 6-24 — Procurement devices.

- Hunting and fishing devices. (See *Figure 6-25* for fishing procurement methods.)
  - Club or rock.

- Spear.
- Slingshot.
- Pole, line, and hook.
- Net.
- Trap.

- Precautions:
  - Wear shoes to protect the feet when wading in water.
  - Avoid reaching into dark holes.
  - Kill animals before handling. Animals in distress may attract the enemy.
  - Do **NOT** secure fishing lines to yourself or the raft.
  - Kill fish before bringing them into the raft.
  - Do **NOT** eat fish with:
    - Spines.

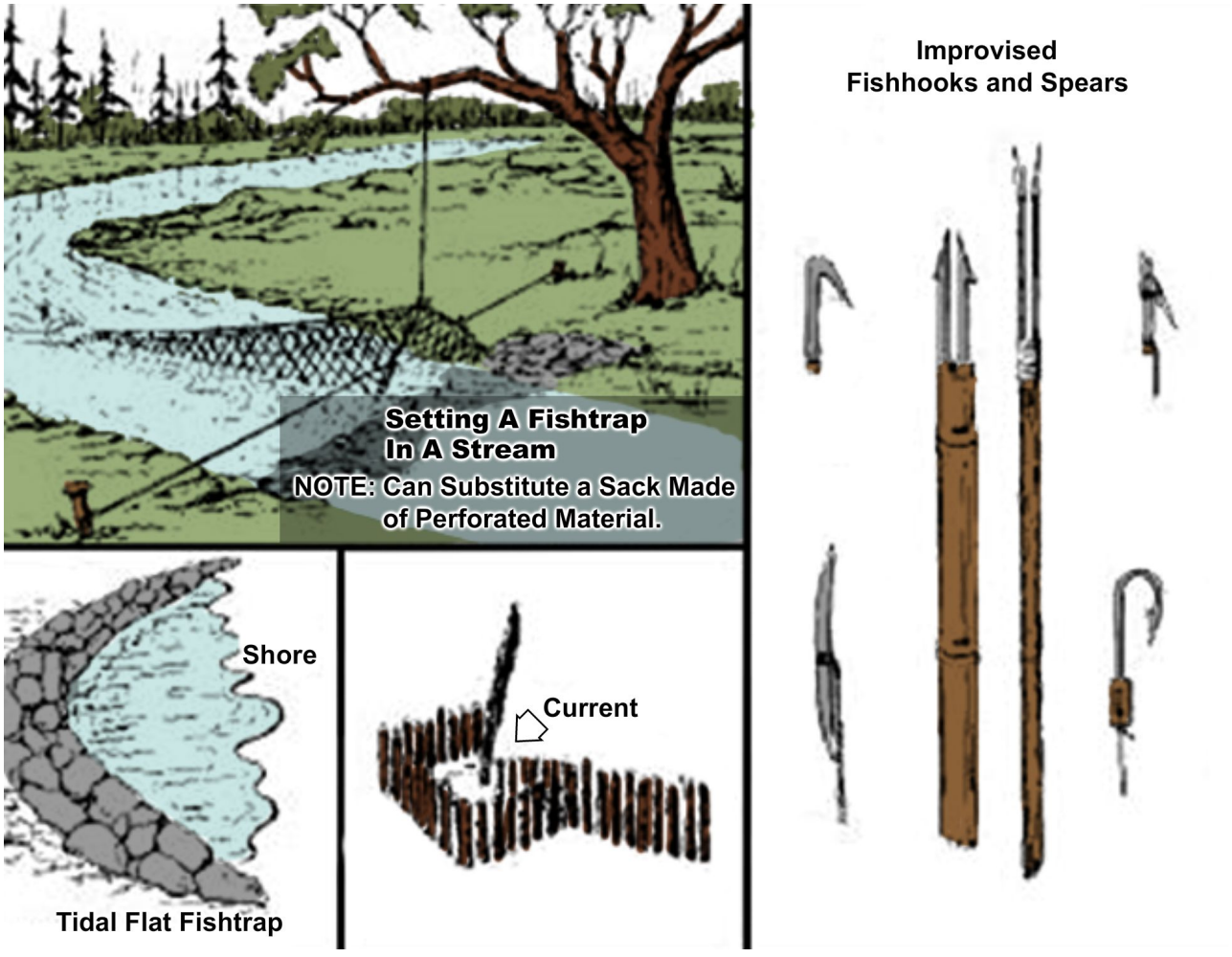


Figure 6-25 — Procurement methods.

  - Unpleasant odor.
  - Pale, slimy gills.
  - Sunken eyes.

- Flabby skin.
- Flesh that remains dented when pressed.

- Do **NOT** eat fish eggs or liver (entrails).
- Avoid all crustaceans above the high tide mark.
- Avoid cone-shaped shells (*Figure 6-26*).

WARNING

These snails can sting and cause acute pain, swelling, paralysis, blindness and possible death in a few hours.

- Avoid hairy insects; the hairs could cause irritation or infection.
- Avoid poisonous insects, for example:
  - Centipedes.
  - Scorpions.
  - Poisonous spiders.
  - Avoid disease carrying insects, such as—
    - Flies.
    - Mosquitoes.
    - Ticks.



Figure 3-26 — Cone shaped shells of venomous snails.

2.3.2.2 Plants

Experts estimate that about 300,000 classified plants grow on the surface of the earth, including many that grow on mountaintops and ocean floors. Of these, 120,000 varieties are edible. Obviously, someone will not be able to learn about all of these plants from reading this manual. But, if one knows what to look for in a particular area, is able to

identify it, and knows how to prepare it properly, it would be possible to find enough to eat to keep alive. It may even become a delicious meal.

Although plants may not provide a balanced diet, especially in the Arctic where the heat-producing qualities of meat are essential, they will sustain life. Many plants, such as nuts and seeds, will give enough protein for normal efficiency. All edible plants provide energy and calorie-giving carbohydrates.

Plants are usually available everywhere to provide the necessary energy while foraging for wild meat. The survivor can depend on them to keep alive if injured and unarmed in enemy territory or in an area where wild life is not abundant.

It is generally safe to try wild plant foods if they are seen being eaten by birds and animals; however, few plants exist in which every part is edible. In addition to the obvious sources of plant foods (fruits, nuts, berries, etc.), many plants have one or more identifiable parts that have considerable food value. For example, certain roots and other underground parts of plants are rich in starch and are an excellent source of food. Some examples are the following:

Wild Potato. This is an example of an edible tuber (*Figure 6-27*). The plant is small and found throughout the world, especially in the Tropics.



Figure 6-27 — Wild potato.

Solomon's Seal. Tubers of Solomon's seal (*Figure 6-28*) grow on small plants and are found in North America, Europe, northern Asia, and Jamaica. Boiled or roasted, they taste much like parsnips.



Figure 6-28 — Solomon's seal.

Water Chestnut. The water chestnut (*Figure 6-29*) is a native of Asia, but it has spread to both tropical and temperate areas of the world, including North America, Africa, and Australia. It is found as a free-floating plant on rivers, lakes, and ponds in quiet water. The plant covers large areas wherever it occurs and has two kinds of leaves—the submerged leaves that are long and root like and the feathery floating leaves that form a rosette on the surface of the water. The nuts borne beneath the water are an inch or two wide with strong spines that give them the appearance of a horned steer. The seed within the horny structure may be roasted or boiled.



Figure 6-29 — Water chestnut.

Nut Grass. Nut grass (*Figure 6-30*) is widespread in many parts of the world. Look for it in moist, sandy places along the margins of streams, ponds, and ditches. It occurs in both tropical and temperate climates. The grass differs from true grass because it has a three-angle stem and thick underground tubers that grow 1/2 to 1 inch in diameter. These tubers are sweet and nutty. Boil, peel, and grind them into flour. This flour can be used as a coffee substitute.



Figure 6-30 — Nut grass.

Taro. (*Figure 6-31*) The taro grows in moist, forested regions of nearly all tropical countries. Taro looks much like a calla lily with leaves up to 2 feet long and stems about 5 feet high. The bloom on this plant is a pale yellow flower about 15 inches long. It has an edible tuber growing slightly below ground level. This tuber must be boiled to destroy irritating crystals. After boiling the tuber, eat it like a potato.



Figure 6-31 — Taro.

Bulrush (*Figure 6-32*). This familiar tall plant is found in North America, Africa, Australia, East Indies, and Malaya. It is usually present in wet, swampy areas. The roots and white stem base may be eaten cooked or raw.



Figure 6-32 — Bulrush.

Ti Plant (*Figure 6-33*). This plant is found in tropical climates, especially in the islands of the South Pacific. It is cultivated over wide areas of tropical Asia. Both the wild and cultivated plants have coarse, shiny, leathery leaves arranged in crowded fashion at the tips of thick stems. The leaves are green and sometimes reddish. This plant grows a large plume like cluster of flowers that usually droop. It bears berries that are red when ripe. The fleshy rootstalk is edible and full of starch, and it should be baked for best results.



Figure 6-33 — Ti plant.

NOTE

If you cannot positively identify an edible plant and choose to try an unknown plant, these guidelines may help determine edibility.

Plant Selection criteria.

- Before testing for edibility, ensure there are enough plants to make testing worth your time and effort. Each part of a plant (roots, leaves, stems, bark, etc.) requires more than 24 hours to test. Do **NOT** waste time testing a plant that is not abundant.
- Test only 1 part of 1 plant at a time.
- Remember that eating large portions of plant food on an empty stomach may cause diarrhea, nausea, or cramps. Two good examples are green apples and wild onions. Even after testing food and finding it safe, eat in moderation.

Avoid plants with the following characteristics:

NOTE

Using these guidelines in selecting plants for food may eliminate some edible plants; however, these guidelines will help prevent choosing potentially toxic plants.

- Milky sap (dandelion has milky sap but is safe to eat and easily recognizable).
- Spines, fine hairs, and thorns (skin irritants/contact dermatitis). Prickly pear and thistles are exceptions. Bracken fern fiddleheads also violate this guideline.
- Mushrooms and fungus. (*Figure 6-34*)
- Umbrella shaped flowers (hemlock is eliminated).
- Bulbs (only onions smell like onions).
- Grain heads with pink, purplish, or black spurs.
- Beans, bulbs, or seeds inside pods.



Figure 6-34 — Fly agaric/ death angle mushrooms and water hemlock.

- Old or wilted leaves.
- Plants with shiny leaves.
- White and yellow berries. (Aggregate berries such as black and dewberries are always edible, test all others before eating.)
- Almond scent in woody parts and leaves.

Test procedures.

⚠ CAUTION ⚠

Test all parts of the plant for edibility. Some plants have both edible and inedible parts. **NEVER** assume a part that proved edible when cooked is edible raw, test the part raw before eating. The same part or plant may produce varying reactions in different individuals.

- Test only 1 part of a plant at a time.
- Separate the plant into its basic components (stems, roots, buds, and flowers).
- Smell the food for strong acid odors. Remember, smell alone does not indicate a plant is edible or inedible.
- DO **NOT** eat 8 hours before the test and drink only purified water.
- During the 8 hours you abstain from eating, test for contact poisoning by placing a piece of the plant on the inside of your elbow or wrist. The sap or juice should contact the skin. Usually 15 minutes is enough time to allow for a reaction.
- During testing, take **NOTHING** by mouth **EXCEPT** purified water and the plant you are testing.
- Select a small portion of a single part and prepare it the way you plan to eat it.
- Before placing the prepared plant in your mouth, touch a small portion (a pinch) to the outer surface of your lip to test for burning or itching.
- If after 3 minutes there is no reaction on your lip, place the plant on your tongue and hold it for 15 minutes.
- If there is no reaction, thoroughly chew a pinch and hold it in your mouth for 15 minutes (do **NOT** swallow). If any ill effects occur, rinse out your mouth with water.
- If nothing abnormal occurs, swallow the food and wait 8 hours. If any ill effects occur during this period, induce vomiting and drink a water and charcoal mixture.
- If no ill effects occur, eat ¼ cup of the same plant prepared the same way. Wait another 8 hours. If no ill effects occur, the plant part as prepared is safe for eating.

⚠ CAUTION ⚠

Ripe tropical fruits should be peeled and eaten raw. Softness, rather than color, is the best indicator of ripeness. Cook unripe fruits and discard seeds and skin.

Cook underground portions when possible to reduce bacterial contamination and ease digestion of their generally high starch content.

⚠ CAUTION ⚠

During evasion, you may not be able to cook. Concentrate your efforts on leafy green plants, ripe fruits, and above ground ripe vegetables not requiring significant preparation.

2.3.2.3 Animals

Foods derived from animals have more food value per pound than those derived from plants. Increase the chance of survival by learning the edible or otherwise useful parts of animals. Also, learn how to prepare the edible parts for cooking.

Most birds should be plucked and cooked with the skin on to retain their food value. After a bird is plucked, cut off the neck close to the body and clean out the inside through the cavity. Wash it out with fresh, clean water. Save the neck, liver, and heart for stew. Most birds are easier to pluck after being scalded. Waterfowl are an exception; they are easier to pluck dry. Scavenger birds, like buzzards and vultures, should be boiled at least 20 minutes before cooking them. This kills the parasites. Save all the feathers plucked from birds. They may be used for insulating shoes or clothing or for bedding. Bird eggs are among the safest of foods. Hard-boil the eggs and carry them for days as reserve food.

Clean and dress the carcass of a fur-bearing animal as soon as possible after killing it because to delay will make your job harder. Cut the throat of the animal and allow the blood to drain into a container. The boiled blood is a valuable source of food and salt. Save the kidneys, liver, and heart. Use the fat surrounding the intestines. All parts of the animal are edible, including the meaty parts of the skull, such as the brain, eyes, tongue, and fleshy portions. Save the skin. It is light when dried, and is good insulation as a bed cover or article of clothing.

The meat of rats and mice is palatable, particularly if cooked in a stew. Rats and mice should be skinned and gutted, then boiled about 10 minutes before cooking. Either may be cooked with dandelion leaves. Always include the livers. Snakes (excluding sea snakes) and lizards are also edible. Remove the head and skin before boiling or frying snakes.

Dogs, cats, hedgehogs, porcupines, and badgers should be skinned and gutted before cooking. Prepare them as stew with a quantity of edible leaves. Dog and cat livers are especially valuable.

2.3.3 Food Preparation

Animal food gives the greatest food value per pound.

Butchering and skinning.

- Mammals.
    - Remove the skin and save for other uses.
    - One cut skinning of small game *(Figure 6-35).*

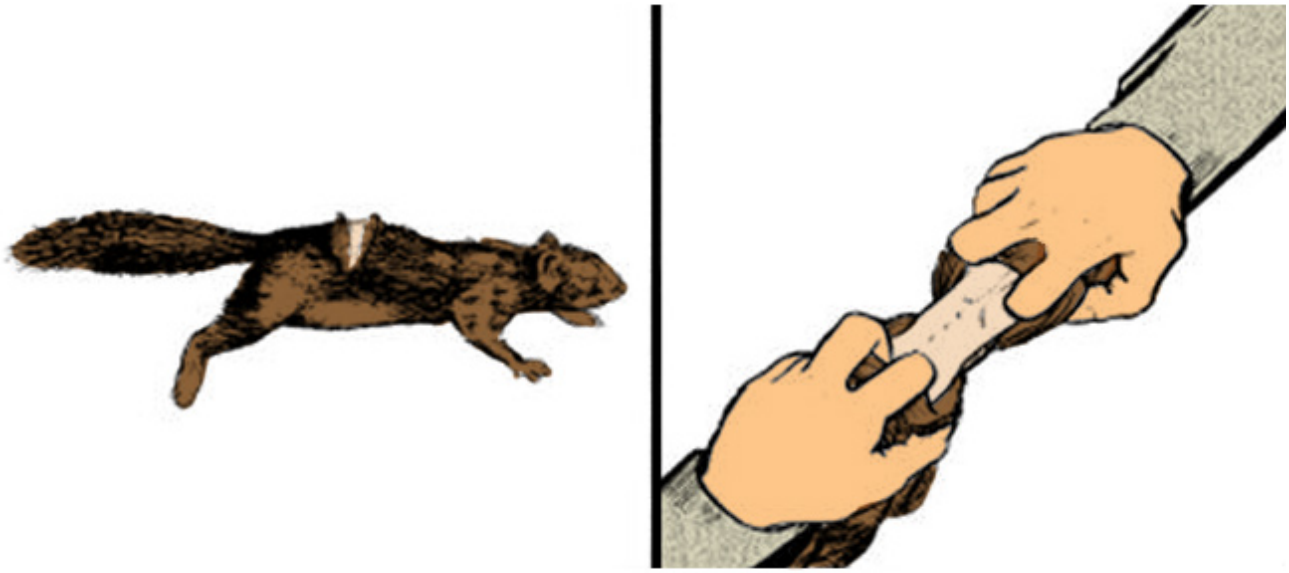


Figure 6-35 — Small game skinning.

Open the abdominal cavity.

- Avoid rupturing the intestines.
- Remove the intestines.
- Save inner organs (heart, liver, and kidneys) and all meaty parts of the skull, brain, tongue, and eyes.

- Wash when ready to use.
- If preserving the meat, remove it from the bones.
- Unused or inedible organs and entrails may be used as bait for other game.

- Frogs and snakes.
  - Skin.
  - Discard skin, head with 2 inches of body, and internal organs.
- Fish.
  - Scale (if necessary) and gut fish soon after it is caught.
  - Insert knifepoint into anus of fish and cut open the belly.
  - Remove entrails.
  - Remove gills to prevent spoilage.
- Birds.
  - Gut soon after killing.
  - Protect from flies.
  - Skin or pluck them.
  - Skin scavengers and sea birds.

- Insects.
  - Remove all hard portions such as the legs of grasshoppers or crickets. (The rest is edible.)
  - Recommend cooking grasshopper-size insects.

CAUTION

Dead insects spoil rapidly, do **NOT** save.

- Fruits, berries, and most nuts can be eaten raw.

Cooking.

CAUTION

To kill parasites, thoroughly cook all wild game, freshwater fish, clams, mussels, snails, crawfish, and scavenger birds. Saltwater fish may be eaten raw.

- Boiling (most nutritious method of cooking—drink the broth).
  1. Make metal cooking containers from ration cans.
  2. Drop heated rocks into containers to boil water or cook food.
- Baking.
  1. Wrap in leaves or pack in mud.
  2. Bury food in dirt under coals of fire.
- Leaching. Some nuts (acorns) must be leached to remove the bitter taste of tannin. Use one of the following leaching methods:

  First method:

  1. Soaking and pouring the water off.
  2. Crushing and pouring water through. Cold water should be tried first; however, boiling water is sometimes best.
  3. Discarding water.

  Second method:

  1. Boil, pour off water, and taste the plant.
  2. If bitter, repeat process until palatable.
- Roasting.
  1. Shake shelled nuts in a container with hot coals.
  2. Roast thinly sliced meat and insects over a candle.

2.3.4 Food Preservation

Keeping an animal alive.

Refrigerating.

- Long term.
  - Food buried in snow maintains a temperature of approximately 32 °F.

- Frozen food will not decompose (freeze in meal-size portions).

- Short term.
  - Food wrapped in waterproof material and placed in a stream remains cool in summer months.
  - Earth below the surface, particularly in shady areas or along streams, is cooler than the surface.
  - Wrap food in absorbent material such as cotton and re-wet as the water evaporates.

Drying and smoking removes moisture and preserves food.

- Use salt to improve flavor and promote drying.
- Cut or pound meat into thin strips.
- Remove fat.
- Do **NOT** use pitch woods such as fir or pine; they produce soot giving the meat an undesirable taste.

Protecting meat from animals and insects.

- Wrapping food.
  1. Use clean material.
  2. Wrap pieces individually.
  3. Ensure all corners of the wrapping are insect proof.
  4. Wrap soft fruits and berries in leaves or moss.
- Hanging meat.
  1. Hang meat in the shade.
  2. Cover during daylight hours to protect from insects.
- Packing meat on the trail.
  1. Wrap before flies appear in the morning.
  2. Place meat in fabric or clothing for insulation.
  3. Place meat inside the pack for carrying. Soft material acts as insulation helping keep the meat cool.
  4. Carry shellfish, crabs, and shrimp in wet seaweed.

⚠ CAUTION ⚠

Do **NOT** store food in the shelter; it attracts unwanted animals.

3.0.0 ESCAPE

Code of Conduct, Art. III — *If I am captured I will continue to resist by all means available. I will make every effort to escape and aid others to escape. I will accept neither parole nor special favors from the enemy*.

The duty of a member of the Armed Forces to continue resistance to enemy exploitation by all means available is not lessened by the misfortune of capture. Contrary to the 1949 Geneva Conventions, enemies which U.S. forces have engaged since 1949 have

regarded the POW compound as an extension of the battlefield. The United States Prisoners of War (USPW) must be prepared for this fact.

In disregarding the provisions of the Geneva Conventions, the enemy has used a variety of tactics to exploit the POWs for propaganda purposes or to obtain military information. The Code of Conduct requires resistance to captor exploitation efforts. Physical and mental harassment, general mistreatment and torture, medical neglect, and political indoctrination have all been used against USPWs in the past.

The enemy has tried to tempt POWs to accept special favors or privileges not given to other POWs in return for statements or information desired by the enemy or for a pledge by the POW not to try to escape.

A USPW must not seek special privileges or accept special favors at the expense of his fellow POWs.

The Geneva Conventions recognize that the regulations of a POW's country may impose the duty to escape and that the POWs may attempt to escape. Under the guidance and supervision of the senior military person and the POW organization, POWs must be prepared to take advantage of escape opportunities whenever they arise. In communal detention, the welfare of the POWs who will remain behind must be considered. A POW must "think escape," must try to escape if able to do so, and must assist others to escape.

The Geneva Conventions authorize the release of POWs on parole only to the extent authorized by the POW's country, and prohibit compelling a POW to accept parole. Parole agreements are promises given the captor by a prisoner of war to fulfill stated conditions, such as not to bear arms or not to escape, in consideration of special privileges, such as release from captivity or lessened restraint. The United States does not authorize any service member to sign or enter into any such parole agreement.

Personnel historically should be familiar with, and prepared for, the implications of the Communist Block Reservation used for Article 85 of the Geneva Conventions of 1949. Article 85 offers protection to a POW legally convicted of a crime committed before capture. Understand that Communist captors then often threatened to use their reservation to Article 85 as a basis for adjudging all members of opposing armed forces as "war criminals." As a result, POWs may find themselves accused of being "war criminals" simply because they waged war against their captors before capture. The U.S. Government does not recognize the validity of this argument.

A successful POW escape causes the enemy to divert forces that might otherwise be fighting, provides the United States valuable information about the enemy and other POWs in captivity, and serves as a positive example to all members of the US Armed Forces.

Personnel should try to escape as soon after capture as possible. An advantage of early escape is that members of the ground forces are usually relatively near friendly forces. For all captured individuals, an early escape attempt takes advantage of the fact that the initial captors are usually not trained guards, that the security system is relatively lax, and that the POW is usually not yet physically debilitated.

Members of the Armed Forces must be familiar with the complications of escape after arrival at an established prisoner of war camp; such as, secure facility and experienced guard system, usually located far from friendly forces, debilitated physical condition of prisoners, psychological factors which reduce escape motivation (barbed wire syndrome) and the often differing ethnic characteristics of escape and the enemy population. Captured personnel should:

- Understand the importance of being alert for escape opportunities, especially for POWs immediately after capture or when confined alone.
- Understand the command supervisory role of the senior military person and the POW organization in escapes from established prisoner of war camps. Understand the responsibilities of escapees to their fellow prisoners.
- Understand the acceptance of parole means a POW has agreed not to engage in a specific act, such as to escape or to bear arms, in exchange for a stated privilege and that U.S. policy forbids a POW to accept such parole.
- Understand the effects on prisoner organization and morale, as well as the possible legal consequences, of accepting a favor from the enemy that results in gaining benefits or privileges not available to all prisoners. Such benefits and privileges include acceptance of release prior to the release of sick or wounded prisoners or those who have been in captivity longer. Special favors include improved food, recreation, and living conditions not available to other POWs.

3.1.0 After You Escape

Once you escape, you may have trouble contacting friendly units even when you know where they are. Approach the problem as you would if you were a member of a lost patrol. Time your movements so that you pass through the enemy forward areas at night and arrive between the enemy and friendly units at dawn. A good plan is to find a ditch or shell hole where you have cover from both friendly and enemy fire. Attract the attention of the friendly forces by waving a white cloth, shouting, exposing or laying out a panel, or some other method. In doing so, you alert friendly forces who are prepared to accept any small group that appears willing to regain contact. When you alert friendly forces, they are not as likely to shoot you on sight.

4.0.0 PERSONNEL RECOVERY (PR)

PR is a system in which the objectives are to return isolated personnel to duty; sustain morale; increase operational performance; and deny adversaries the opportunity to influence our military strategy and national will by exploiting the intelligence and propaganda value of isolated personnel. It is a system comprised of preparation, planning, execution, and adaptation functions. Although presented in the apparent sequential order of preparation, planning, execution, and adaptation, it is important to understand that these activities can occur simultaneously or in any sequence. The PR system is iterative and the individual activities are interdependent; a change occurring in one portion can affect what is happening in the other three. The functions are not discrete steps, but rather activities that continuously interact with one another and adjust or adapt to ensure the system remains relevant and effective.

4.1.0 General

Adversaries purposely seek to isolate, capture, and detain U.S. personnel to seek tactical, operational, and strategic advantage. Isolation may occur across the continuum of operations.

Isolated military personnel, if not successfully recovered and returned t o U.S. control, must be capable of surviving and be able to return with honor. Applicable civilians associated with Navy should have the foundation necessary to cope with possible capture.

Previous risk paradigms do not accurately reflect risk of isolation in the 21st century. As a result, commanders must constantly evaluate their forces' risk of isolation and coordinate to update. Risk assessment is inherently a commander's responsibility. This policy seeks to validate and establish a risk-based Survival, Evasion, Resistance, and Escape (SERE) training requirements matrix based on warfare area and unit; however, this guidance does not lessen a commander's responsibility to assess risk and determine if any additional training is required to meet a threat environment.

The Navy PR program encompasses four areas:

- Individual Preparation: Code of Conduct (CoC) training; SERE training; High Risk of Isolation (HRI) briefing; and the provisioning of potential isolated personnel with survival, evasion, location, and communications capabilities.
- PR Execution: Operations and supporting capabilities designed to affect the recovery of isolated personnel in support of component-level operations. Navy PR missions include, but are not limited to, SAR - when used in the context of a PR event - Combat SAR (CSARI, and Naval Special Warfare (NSW) Unconventional Assisted Recovery (UAR).
- PR Command and Control (C2): The capability to plan PR missions, exercise C2 over assigned recovery forces, coordinate the execution of PR tasks, and integrate w i t h joint PR architectures.
- Reintegration: The return of formerly isolated personnel through a formal process of medical care, psychological decompression, operational/intelligence debriefings, and public affairs coordination.

4.1.0 Authentication System

In wartime, the recovery of isolated personnel may depend on early authentication. Normally, isolated personnel will not receive assistance until their identity has been authenticated. An effective authentication system is essential to protect CSAR forces from enemy entrapment. To achieve this objective, authentication information must be used in a manner that maintains security and viability.

Authentication of isolated personnel may be accomplished in several ways, depending on the situation. The principal method of authentication will likely be by radio using the unit authentication numbers, data from the survivor’s ISOPREP, or locally developed authentication codes. Authentication can also be accomplished using visual signals or Time on Target (TOT) requirements. For personnel controlled or escorted in an E&E net, authentication may also include fingerprints or physical characteristics.

4.1.1 Unit Authentication

Tactical ground and flying forces will be provided a unit authentication number consisting of four numbers. These numbers will be assigned to units down to and including company or squadron level. Personnel assigned or attached to these units will use these numbers for authentication purposes.

4.1.2 Personal Authentication

The personal authentication data will consist of DD Form 1833, Isolated Personnel Report (ISOPREP), It will be completed by each person subject to action in or over hostile territory. It contains personal information which may be used by CSAR forces to ensure positive identification of survivors. After the member has completed the card, it will be classified “CONFIDENTIAL” and will be maintained by the appropriate unit

intelligence or operations personnel. Personal will review their ISOPREP at least semiannually. Area commanders will establish procedures to ensure DD Forms 1833, Isolated Personnel Report (ISOPREP), or data contained on them, can be made immediately available to the appropriate Recovery Control Center (RCC).

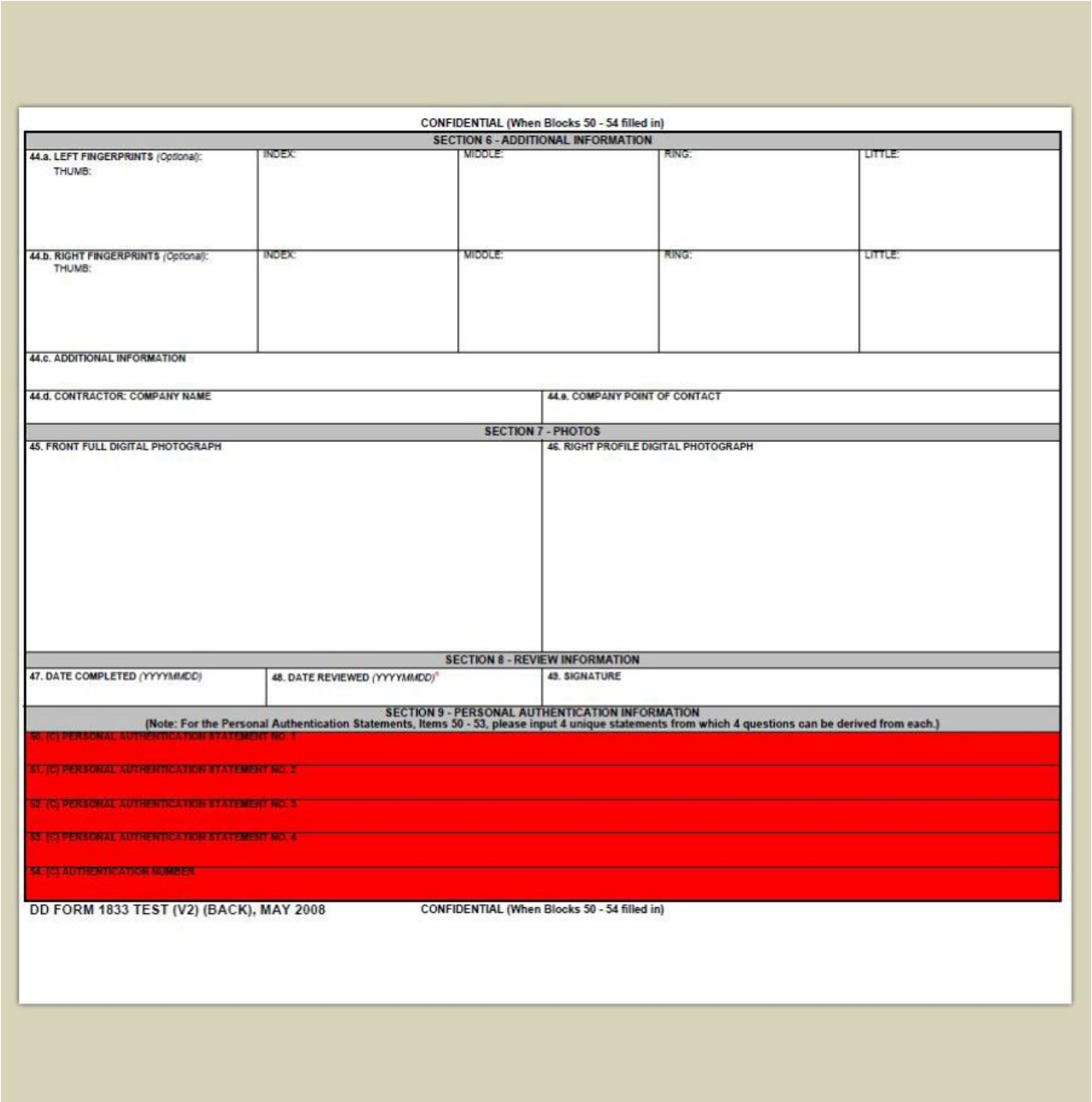
4.1.3 Local Authentication Codes

The development of local SAR letters and colors is recommended. These additional authentication systems should be published in the Special Instructions (SPIN) portion of the daily tasking order and briefed to members. The use of daily or frequently changed SAR letters and colors can provide immediate authentication of isolated personnel and increase the scope of the authentication systems.

4.2.0 Completing the ISOPREP

Personnel will complete the DD Form 1833, Isolated Personnel Report (ISOPREP) (*Figures 6-36 and 6-37*) by entering the following information:

- Personal Information
- Uniform Data
- Training/Capability Data
- Reintegration Information
- Additional Information
    - Finger Prints
- Digital Photos
- Personal Authentication Information



CONFIDENTIAL (When Blocks 50 - 54 filled in)

SECTION 6 - ADDITIONAL INFORMATION

44.a. LEFT FINGERPRINTS *(Optional)*: THUMB:	INDEX:	MIDDLE:	RING:	LITTLE:
44.b. RIGHT FINGERPRINTS *(Optional)*: THUMB:	INDEX:	MIDDLE:	RING:	LITTLE:

44.c. ADDITIONAL INFORMATION

44.d. CONTRACTOR: COMPANY NAME	44.e. COMPANY POINT OF CONTACT

SECTION 7 - PHOTOS

45. FRONT FULL DIGITAL PHOTOGRAPH	46. RIGHT PROFILE DIGITAL PHOTOGRAPH

SECTION 8 - REVIEW INFORMATION

47. DATE COMPLETED *(YYYYMMDD)*	48. DATE REVIEWED *(YYYYMMDD)*	49. SIGNATURE

SECTION 9 - PERSONAL AUTHENTICATION INFORMATION

(Note: For the Personal Authentication Statements, Items 50 - 53, please input 4 unique statements from which 4 questions can be derived from each.)

50. (C) PERSONAL AUTHENTICATION STATEMENT NO. 1

51. (C) PERSONAL AUTHENTICATION STATEMENT NO. 2

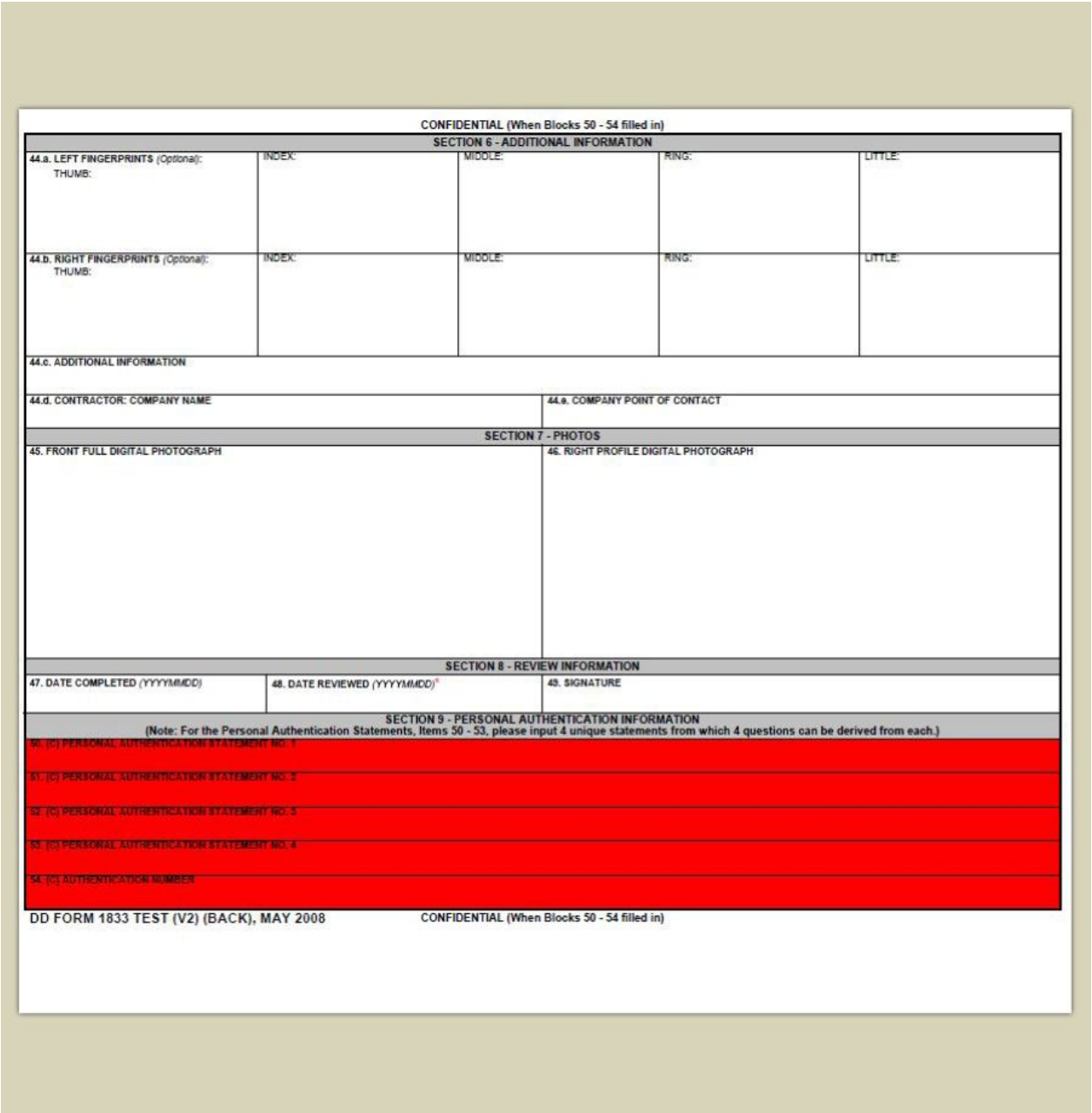
52. (C) PERSONAL AUTHENTICATION STATEMENT NO. 3

53. (C) PERSONAL AUTHENTICATION STATEMENT NO. 4

54. (C) AUTHENTICATION NUMBER

DD FORM 1833 TEST (V2) (BACK), MAY 2008 CONFIDENTIAL (When Blocks 50 - 54 filled in)

Figure 6-36 – ISOPREP front view.



CONFIDENTIAL (When Blocks 50 - 54 filled in)

SECTION 6 - ADDITIONAL INFORMATION

44.a. LEFT FINGERPRINTS *(Optional)*: THUMB:	INDEX:	MIDDLE:	RING:	LITTLE:
44.b. RIGHT FINGERPRINTS *(Optional)*: THUMB:	INDEX:	MIDDLE:	RING:	LITTLE:

44.c. ADDITIONAL INFORMATION

44.d. CONTRACTOR: COMPANY NAME	44.e. COMPANY POINT OF CONTACT

SECTION 7 - PHOTOS

45. FRONT FULL DIGITAL PHOTOGRAPH	46. RIGHT PROFILE DIGITAL PHOTOGRAPH

SECTION 8 - REVIEW INFORMATION

47. DATE COMPLETED *(YYYYMMDD)*	48. DATE REVIEWED *(YYYYMMDD)*	49. SIGNATURE

SECTION 9 - PERSONAL AUTHENTICATION INFORMATION

(Note: For the Personal Authentication Statements, Items 50 - 53, please input 4 unique statements from which 4 questions can be derived from each.)

50. (C) PERSONAL AUTHENTICATION STATEMENT NO. 1

51. (C) PERSONAL AUTHENTICATION STATEMENT NO. 2

52. (C) PERSONAL AUTHENTICATION STATEMENT NO. 3

53. (C) PERSONAL AUTHENTICATION STATEMENT NO. 4

54. (C) AUTHENTICATION NUMBER

DD FORM 1833 TEST (V2) (BACK), MAY 2008 CONFIDENTIAL (When Blocks 50 - 54 filled in)

Figure 6-37 – ISOPREP back view.

4.3.0 Use of the ISOPREP

Upon notification that a member of the unit is missing or isolated in hostile territory, the unit will forward the individual's ISOPREP data to the appropriate RCC by the fastest secure means available. Information passed telephonically will be followed up by message. The RCC or operations center will disseminate data contained on DD Form 1833 to other authorized agencies, including allied forces if practicable, to assist in the recovery effort.

Upon notification that recovery operations have been unsuccessful or terminated, appropriate entries will be made on DD Form 1833 and the information filed. Copies of the ISOPREP and other pertinent information will be disseminated to other agencies (for example, SOC, Joint Personnel Recovery Center (JPRC)) according to theater directive.

4.4.0 Authentication Procedures

Once an evader is detected, the recovery force will require ID authentication to confirm that an adversary attempting to entrap a recovery force has not replaced the evader. Recovery may not be immediate, and depends on the situation. After an evader has been out of contact, even for a short time, re-authentication may be required and could occur multiple times. Definitive authentication will be based on the information contained in the ISOPREP, which contains questions (blocks 50 thru 54) the evader should recognize and be able to answer. Generally, the recovery force does not carry the ISOPREP with them on the mission, to preclude loss or compromise; they must contact the RCC or unit holding the ISOPREP to obtain the information. The RCC will consider releasing only one statement per-mission to CSAR forces. This method will ensure the other statements remain uncompromised and available for use during future missions. If the evader is unable to respond to questioning, the ISOPREP (blocks 7, 13, 14, 15 and 20) contains information on the individual's physical attributes that may assist in confirming an identity. If identity is in doubt, the recovery force will follow accepted detainee handling procedures pending authentication or return to friendly territory.

4.5.0 Isolated Personnel Responsibilities Prior to Recovery

Isolated personnel are an integral part of any recovery effort. Consequently, they must perform their portion of each PR task successfully to aid their own recovery. During recovery, isolated personnel should:

- Respond quickly and accurately to authentication procedures and requests for ISOPREP information.
- Provide positional assistance to recovery forces to the greatest extent possible.
- Properly use all issued signaling devices and improvise signals, as needed, to improve the chances of being sighted.
- Provide pertinent information about the dispersal of other group members, if applicable.
- Inform recovery forces if operational developments require altering their EPA and hence, the recovery plan.
- Be prepared to receive and follow instructions from the recovery force that requires EPA alterations to adapt to operational exigencies.
- Pay close attention to and explicitly follow instructions of recovery forces to the maximum extent possible given the tactical situation (including adversary positions and medical condition).
- Continue to communicate with inbound recovery forces, as required, to ensure their authentication and location is understood and retrieval is efficiently executed.
- Remember the word of the day/letter of the day/number of the day/challenge/ password and near and far recognition signals.
- Do not run toward the recovery vehicle until or unless directed. Weapons should not be held in a manner that could be perceived as threatening.
- Be prepared to be treated as a captive until you are authenticated. Authentication might not occur until you are handed over by the recovery forces.

Summary

In this chapter, you were introduced to the basics of evasion, survival, and escape. These basic skills are intended to aid in your survival, evasion, and if caught, your escape from the enemy. You learned how to travel to avoid the enemy and some crucial points to remember when evading. You will need to practice some of these skills to become proficient in their use. You learned what safe foods are, how to locate drinking water, and about some poisonous foods. It would be a good idea to review what types of food are in the environment in which you are deploying. You also learned some aspects as to how to escape and what order certain things should be performed. Review these skills often, especially before deployments to keep them fresh in your mind.

Assignment 6

Objectives

1. Specify the travel and observation techniques for evading the enemy under given conditions.
2. Describe principles and techniques of survival for individuals or group leaders during evasion.
3. Identify the requirements and responsibilities of a group leader while the group is isolated behind enemy lines.
4. Specify survival techniques to be used while evading the enemy.
5. Explain different methods for a successful escape.
6. Describe actions required to maintain your health.
7. Describe personnel recovery procedures.

Questions

1. The _____ is a critical document to an individual or to a unit faced with evading enemy forces.

    1. SMEAC
    2. EPA
    3. BLISS
    4. SURIVIAL

2. Which of the following is a basic camouflage principle employed during evasion?

    1. Remain in jungle areas during the hours of darkness
    2. Choose an area with escape routes
    3. Conducting observation from a seated position
    4. Disturb the area as little as possible

3. What acronym should be used when locating shelter if evading enemy forces?

    1. SMEAC
    2. EPA
    3. BLISS
    4. SURIVIAL

4. When using the straight-line heading technique as an evasion route, approximately how many paces would you need to travel 2 kilometers over open terrain?

    1. 1200
    2. 600
    3. 1800
    4. 900

5. A movement technique is Stop, Look, Listen and Smell at _____ intervals.

    1. irregular
    2. regular
    3. two hour
    4. one and a half to two hour

6. While evading, how should you enter a deep ditch?

    1. Head first
    2. Back first
    3. Feet first
    4. Stay out of a deep ditch

7. What is the best way to remain on your intended course while evading the enemy?

    1. Choose a man-made landmark in your direction of travel; then proceed toward it
    2. Choose a landmark a prominent natural feature in your direction of travel; then proceed toward it
    3. Mark your route by cutting vegetation or by bending bushes and limbs
    4. Choose the direction of the sun's movement and follow it

8. If you find yourself isolated behind enemy lines, the letters of what keyword tell you what to do?

    1. E-V-A-S-I-O-N
    2. E-S-C-A-P-E
    3. S-U-R-V-I-V-A-L
    4. K-O-C-O-A

9. What action should you, the leader of a group of evaders, take to keep the group organized?

    1. Ensure the group is kept well-informed
    2. Change the evasion plan from day to day
    3. Assign tasks to individuals based on expediency
    4. Ignore advice volunteered by other members of the group

10. What action should be taken by the group leader in making decisions for an evasion group?

    1. Ignore advice volunteered by other members of the group
    2. Ask for information and advice from other members of the group
    3. Let the other members of the group decide what is best
    4. Change the evasion plan from day to day

11. To maintain physical efficiency, you need to consume, at a minimum, what amount of water each day?

    1. 1 pint
    2. 2 pints
    3. 1 quart
    4. 2 quarts

12. In which one of the following locations is the water table closest to the surface of the earth?

    1. Lands overlooking river valleys
    2. Rock-covered hilltops
    3. Low-lying forests
    4. Large, open fields

13. What is the proper method for extracting water from a growing vine?

    1. Cut the vine off just above ground level, then cut the vine in 24-to 36-inch lengths, remove the outer covering and begin sucking, out the water
    2. Cut a deep notch high on the vine, cut the vine off close to the ground, then let the water drip into your mouth or a container
    3. Cut the vine in short sections, 6-to 8-inches in length, and beat them with a rock over a pan to catch the water
    4. Remove the outer covering of the vine, cut the inner pulp in short sections, and then chew the sections

14. To obtain drinking water from the seashore, you should dig holes in the sand approximately what distance above the high-tide mark at low tide?

    1. 200 yards
    2. 100 yards
    3. 100 feet
    4. 50 feet

15. After estimating that you will be on your own for 30 days, you should plan to budget your food supply in what way?

    1. One third for the first 10 days and two-thirds for the last 20 days
    2. One half for the first 15 days and one half for the last 15 days
    3. Two thirds for the first 15 days and one third for the last 15 days
    4. Three fourths for the first 15 days and one fourth for the last 15 days

16. Which of the following insects should you avoid eating?

    1. Grasshoppers
    2. Grubbs
    3. Termites
    4. Centipedes

17. Which one of the pictures below is that of a venomous snail?

1. 

2. 

3. 

4. 

18. How can you determine if a plant growing in the tropics is edible?

1. Taste it
2. Notice if wild animals eat it
3. Examine the leaves
4. Smell it

19. How many hours does it take to test each part of a plant to see if it is edible?

1. 24
2. 12
3. 18
4. 20

20. What is the first step in testing a plant to see if it is edible?

1. Smell the food for strong acid odors
2. Touch a small portion to the outer surface of your lip to test for burning or itching.
3. Just swallow it and wait 8 hours
4. Separate the plant into its basic components

21. What type of fowl is easier to pluck dry?

1. Guinea hen
2. Duck
3. Buzzard
4. Pheasant

22. Which of the following can be eaten raw?

1. Salmon
2. Wild pig
3. Clams
4. Crawfish

23. Which article of the Code of Conduct requires you to resist capture by all means available?

    1. I
    2. II
    3. III
    4. IV

24. Personnel should be familiar with, and prepared for, the implications of the Communist Block Reservation used for Article _____ of the Geneva Conventions.

    1. 82
    2. 83
    3. 84
    4. 85

25. What course of action should you perform when you are approaching friendly lines while evading the enemy?

    1. Shout out to them that you are a Seabee
    2. Expose yourself and raise your arms as your approach
    3. Display a white flag or another white object before exposing yourself
    4. Fire your weapon three times as you approach

26. If captured, when should you begin planning your escape?

    1. After arriving at the POW camp
    2. 2 days after being captured
    3. 5 days after being captured
    4. Immediately after being captured

27. After being captured, when is the best time for you to try and escape?

    1. During the first week of capture
    2. Approximately 2 weeks after capture
    3. As soon as possible
    4. After the first meal

28. After you have escaped, what is the best time to arrive at friendly lines?

    1. Dusk
    2. Dawn
    3. Midnight
    4. Noon

29. The Navy PR program encompasses how many areas?

    1. 1
    2. 2
    3. 3
    4. 4

30 SERE training comes under which area of the Navy PR program?

1. Individual preparation
2. PR Execution
3. PR Command and Control
4. Reintegration

31. What form is used to record personal authentication data for use with the PR program?

1. DD Form 1250
2. DD Form 312
3. DD Form 1833
4. DD Form 1251

32. Which of the following is a responsibility of an isolated individual prior to recovery?

1. Be prepared to approach the recovery vehicle without direction
2. Provide pertinent information about the dispersal of other group members
3. Coordinate with CoC for time and date of pick-up and method to use
4. Continue to communicate with captives until authentication occurs

Assignment 6

Evasion, Survival, Escape, and Recovery

Directions: Select the correct answer from the list of alternates below each question in the end of chapter assignment. Write in the answer next to the corresponding question number below. Use this answer sheet as a reference to completing the online assignment related to this assignment.

1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	

12.	
13.	
14.	
15.	
16.	
17.	
18.	
19.	
20.	
21.	
22.	

23.	
24.	
25.	
26.	
27.	
28.	
29.	
30.	
31.	
32.	

Additional Resources and References

This chapter is intended to present thorough resources for task training. The following reference works are suggested for further study. This is optional material for continued education rather than for task training.

Personnel Recovery, Joint Publication (JP) 3-50

Joint Doctrine for Evasion and Recovery, Joint Publication (JP) 3-50.3

OPNAVINST 1000.24 (series), Personnel Recovery

Survival, Evasion and Recovery, Multiservice Procedures for Survival, Evasion and Recovery, Naval Warfare Publication (NWP) 3-50.3

Combat Search and Rescue Procedures, Naval Warfare Publication (NWP) 19-2

Survival, U.S. Army Field Manual (FM) 3-05.70

Trainee Feedback

Center for Seabees and Facilities Engineering (CSFE) makes every effort to keep their courses up-to-date and free of technical errors. If you have a suggestion, found an error or inaccuracy, please write, FAX or email us by using the form below. Use one form for each comment and be sure to fill in the information as accurately and detailed as possible. Thank you for your assistance.

Write: CSFE
NCF Training Division (N7B)
3502 Goodspeed St.
Port Hueneme, CA 93043-4337

FAX: (805) 982-5508 / DSN 551-5508

E-mail: CSFE_CBCH@navy.mil

Trainee Feedback Form

Course: Seabee Combat Handbook, Volume ____, NAVEDTRA: _____

Course Date: _____ Chapter Number: _____ Page: _____

Paragraph: _____ Sentence: _____ Figure: _____ Frame/View: _____

Description: _____
_____
_____
_____
_____
_____

(optional) Corrective action: _____
_____
_____

(optional) Supporting reference(s): _____
_____

Your email address, if a response is requested: _____

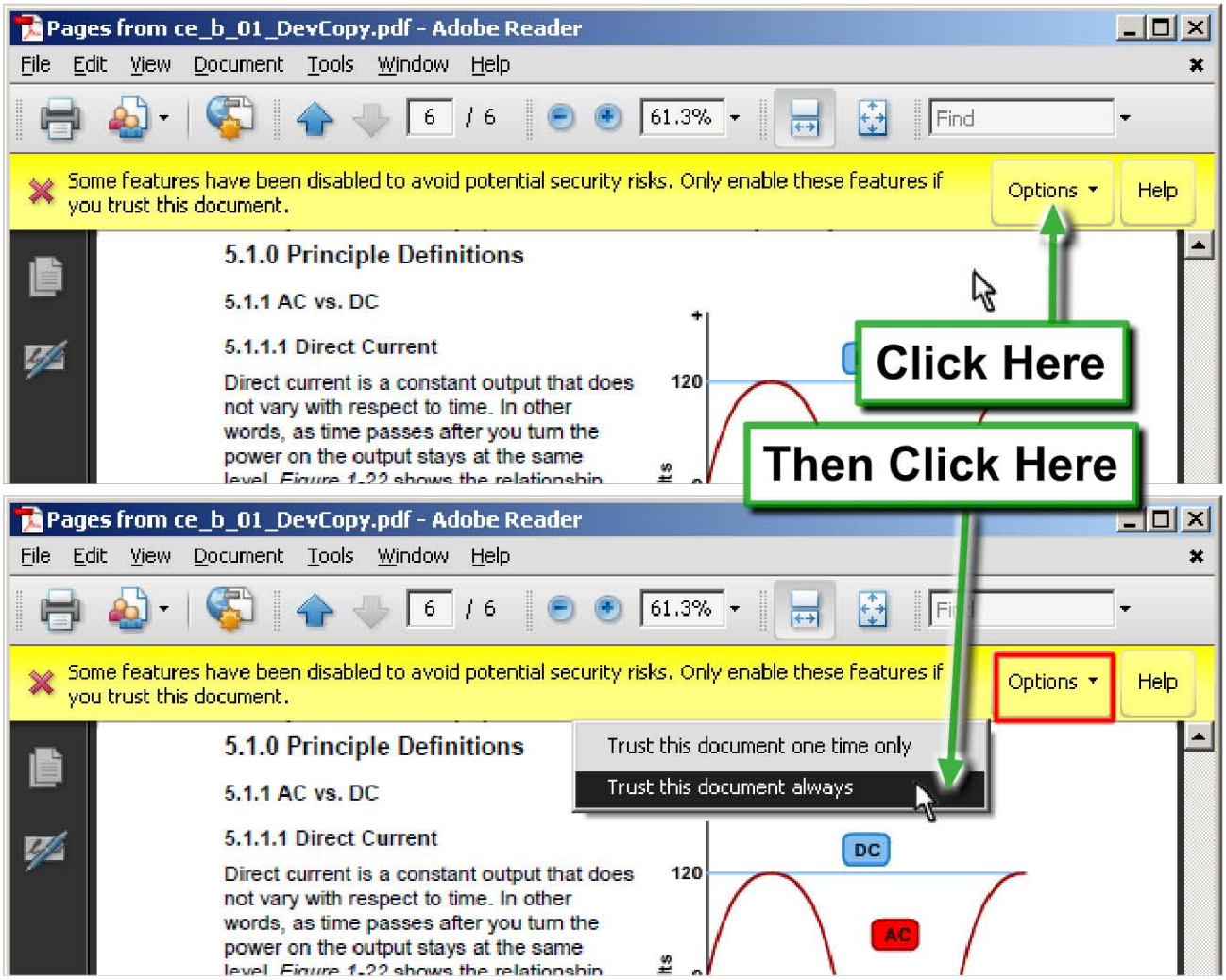
The Interactive features of this manual are currently disabled.

Many graphics will not appear correctly unless these features are turned on. You should either see a popup window, or a yellow banner at the top of the application. To enable the Interactive features of this manual follow the steps illustrated below:

If you see a popup window do the following:



If you see a yellow banner, do the following:



Once you have completed either of the above procedures the features will be enabled for this document, and this warning won't appear again after you leave this page.

Chapter 7

Individual Protective Measures

Topics

1.0.0 Cover and Concealment

2.0.0 Fighting Emplacements

3.0.0 Concealment

4.0.0 Camouflage

To hear audio, click on the icon: 

Overview

This chapter presents the principles of constructing, camouflaging, and using individual protective measures. Camouflaging is nothing more than hiding or concealing your position or equipment by blending it in with the natural or local surroundings to avoid detection by the enemy. Intelligent use of the terrain sometimes reduces the labor and time required for the construction of emplacements or positions to provide you protection while firing at the enemy. In many cases, the natural configuration of the ground provides emplacements that require little, if any, improvements. This chapter will provide you with guidance on the correct application of these protective measures.

Objectives

When you have completed this chapter, you will be able to:

1. Specify the principles of cover and concealment and their application in construction of a fighting emplacement.
2. Specify the principles of camouflage and the methods of camouflaging a temporary battlefield position, yourself, your equipment, buildings, and supply points.

Prerequisites

There are no prerequisites for completing this manual.

Features of this Manual

This manual has several features which make it easy to use online.

- Figure and table numbers are italicized within the handbook text. Figure and table reference numbers are conveniently located next to (or near) the applicable handbook text.
- Audio and video clips are included in the text, with italicized instructions telling you where to click to activate the appropriate link.
- Review questions are included at the end of this chapter as the chapter assignment. To submit assignments log into https://www.courses.netc.navy.mil, go to “Student Services”, in the drop down click on “Active Courses”, go to

"View/Submit Answers" next to the course you wish to submit answers for. Assignments may be submitted to the above Web site as they are completed, and instant scoring is available. Your completion letter is available as soon as you pass all assignments.

- A form at the end of each chapter allows your input for improving the manual or correcting errors to be brought to the attention of CSFE's Technical Review Committee. Your input is important and will help keep this manual up to date and free of technical errors.

1.0.0 COVER AND CONCEALMENT

Cover is protection from the fire of hostile weapons. It may be natural or artificial. Natural cover (ravines, hollows, and reverse slopes) and artificial cover (fighting holes, trenches, and walls) protect you from flat trajectory fire (projectiles traveling at nearly horizontal angles), and partially protect you from high-angle fire and the effects of nuclear explosions.

Concealment is protection from hostile ground or air observation, but not from hostile fire. It, too, can be natural or artificial. Objects in their natural locations, such as bushes, grass, and shadows, provide natural concealment. Artificial concealment is made from materials, such as burlap, nets, tents, or natural material.

The best combat position provides maximum cover and maximum concealment.

2.0.0 FIGHTING EMPLACEMENTS

A fighting emplacement is the position you occupy for the purpose of firing your weapon at the enemy. It provides a good firing position with maximum cover and concealment. A temporary position is converted to a fighting emplacement and it may be improved by digging in, construction, concealment of fresh soil, and improvement.

2.1.0 Digging In

Start digging in when the combat situation requires or allows it, and take advantage of all available natural cover. You should have an entrenching tool; however, you can dig with your bayonet or helmet, or both. When necessary, clear the brush to improve your field of fire (the direction you will be firing at the enemy).

Since the Seabees work with ditchdiggers, backhoes, and other types of heavy construction equipment, you probably have access to this equipment to help with digging and building your fighting emplacement. Of course, this depends upon where the emplacement is, what the defensive situation is, and how long you are expected to stay in the position.

2.2.0 Construction

Construction includes the improvement of earthworks by placing logs or other objects in defensive positions, such as along parapets (a wall or river bank) and overhead. A position should be continually improved as long as it is occupied.

Another area that might show a difference in the construction of the defensive position would be if a battalion used a prefabricated fighting hole made from corrugated metal, or a bunker made of block or concrete with a metal plate for a roof. Since Seabees have access to construction materials, their positions can be made more permanent. Seabee positions are used as a base camp, or a central position, where they can go to project sites and return when the project has been completed.

2.3.0 Concealment of Fresh Soil

The appearance of fresh soil betrays the location of your emplacement to enemy observers. Therefore, the plan for your dug-in emplacement must include some way to dispose of the soil. Use part of it to make a parapet or ridge around the emplacement. When you start digging in, first slice off the top turf and set it aside. Then as you dig out fresh soil, use it to build a parapet around the position about 6 inches high and 3 feet wide. Then lay the turf back on this parapet. If more fresh soil must come out, place it in

a sandbag or on a canvas and move it well away from the position. Dispose of fresh soil under low bushes, in a stream, pond, or ravine, or camouflage it in another manner, to the rear of the forward edge of battle area.

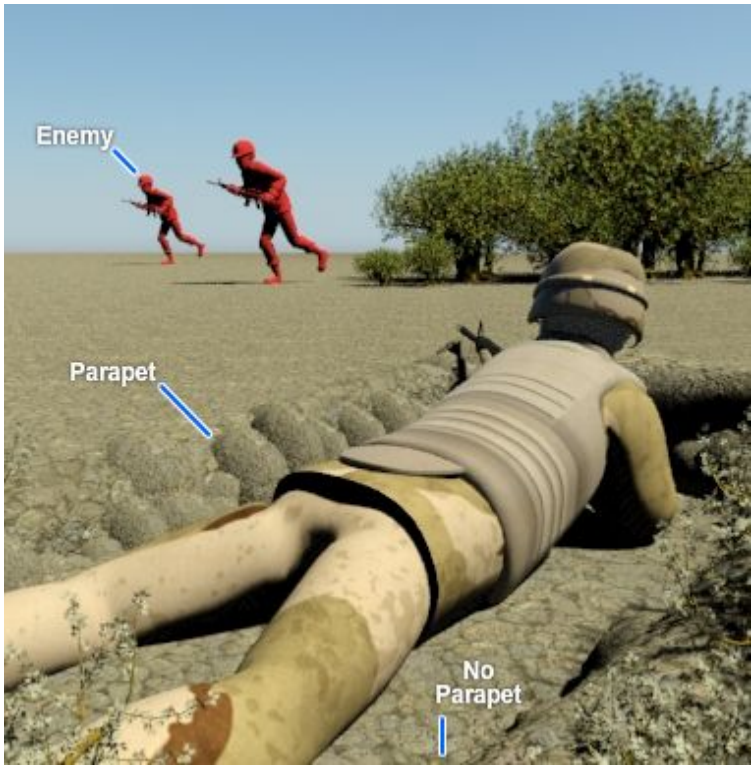


Figure 7-1 — Skirmisher's trench.

2.4.0 Types of Dug-in Emplacements

The simplest type of dug-in emplacement is the skirmisher's trench, as shown in *Figure 7-1*. This shallow pit type of emplacement provides a temporary, open, prone firing position for the individual rifleman. When the situation demands immediate shelter from heavy enemy fire, and when existing defiladed firing positions (positions that provide protection from fire or observation, such as ridges, embankments, and ravines) are not available, each rifleman lies prone or on their side. With the entrenching tool, scrape and pile the soil in a low parapet between you and the enemy. Thus, a shallow, body-length pit can be formed quickly in all but the hardest ground. The trench should be oriented with respect to the line of fire of the enemy so it is least vulnerable to enfilade fire (fire from the flanking or side position). In a skirmisher's trench, you present a low silhouette to the enemy and are afforded some protection from small-arms fire.

Figure 7-2 shows camouflaged fighting positions that may be built while either in contact with the enemy or before contact with the enemy is made. They are a more permanent type of construction than the skirmisher's trench. They may or may not be covered. The two shown are covered, which helps prevent detection, but they do not provide much protection from enemy fire. They are constructed to enable someone to fire from a standing position with most of the body protected from enemy fire. These emplacements help provide protection from small-arms fire, shell fragments, bombings, and the crushing action of tanks.



Figure 7-2 — Camouflaged fighting position.

Figure 7-3, frame 1, shows a cut-timber revetment, constructed when the soil is soft enough to require the timber support shown. Again, this is a more permanent type of emplacement and is normally built only when a unit expects to stay in an area for quite some time. You would fire from a standing position with most of your body protected from enemy fire. *Figure 7-3, frame 2*, shows a fighting position with an overhead cover providing cover from enemy fire as well as concealment from the enemy.

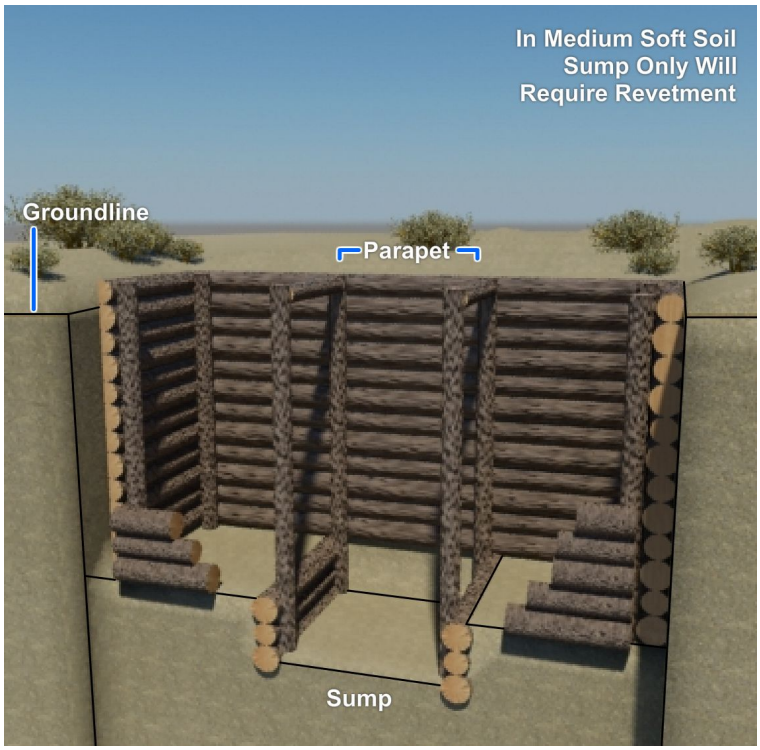


Figure 7-3 — Reinforced fighting positions.

The internal construction of a one-fighting position is shown in *Figure 7-4*. One-person deliberate fighting positions are constructed when time and materials are available and the tactical situation warrants additional protection. The excavation is relatively small, making it easier to use materials from the surrounding area for overhead cover and

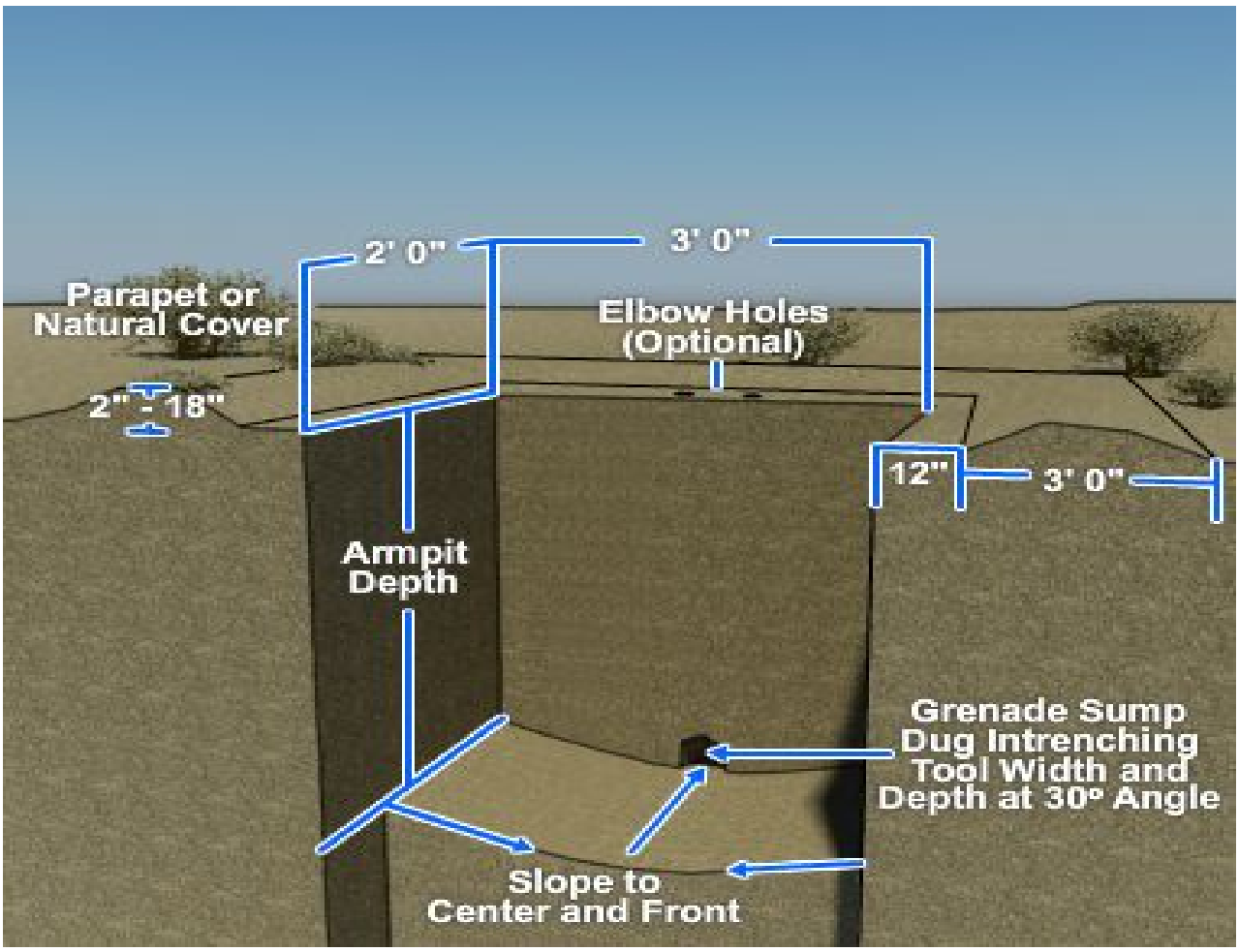


Figure 7-4 — One-person fighting position.

camouflage. This position must allow the individual to fire to the front and oblique while behind frontal cover. Grenade sumps should be dug into the bottom front face of the position at approximately a 30-degree angle and 12 to 18 inches deep, about the length of an entrenching tool. The width of the sump should be approximately equal to the width of the entrenching tool shovel. Use whatever tools are available to slope the floor towards the grenade sump. This will make it easier to kick a grenade into the hole and get out of the way so the blast goes into the back wall.

Two-person deliberate fighting positions (*Figure 7-5*) are most common. Basic requirements for these positions are essentially the same as those for one-person fighting positions with key differences. Although this position is preferred, it is not without drawbacks. Two-person fighting positions require more digging and prove difficult to camouflage. It also provides a better target for grenades because the excavation is larger. Typical combat gear such as the M-16 rifle and helmet can be used to measure dimensions. Grenade sumps are constructed at each end of the two-person deliberate fighting position. This allows the blast to go straight up while occupants move to the opposite end of the position. The floor should be sloped towards the grenade sumps on each end to make it easier to kick the grenade into the sump.

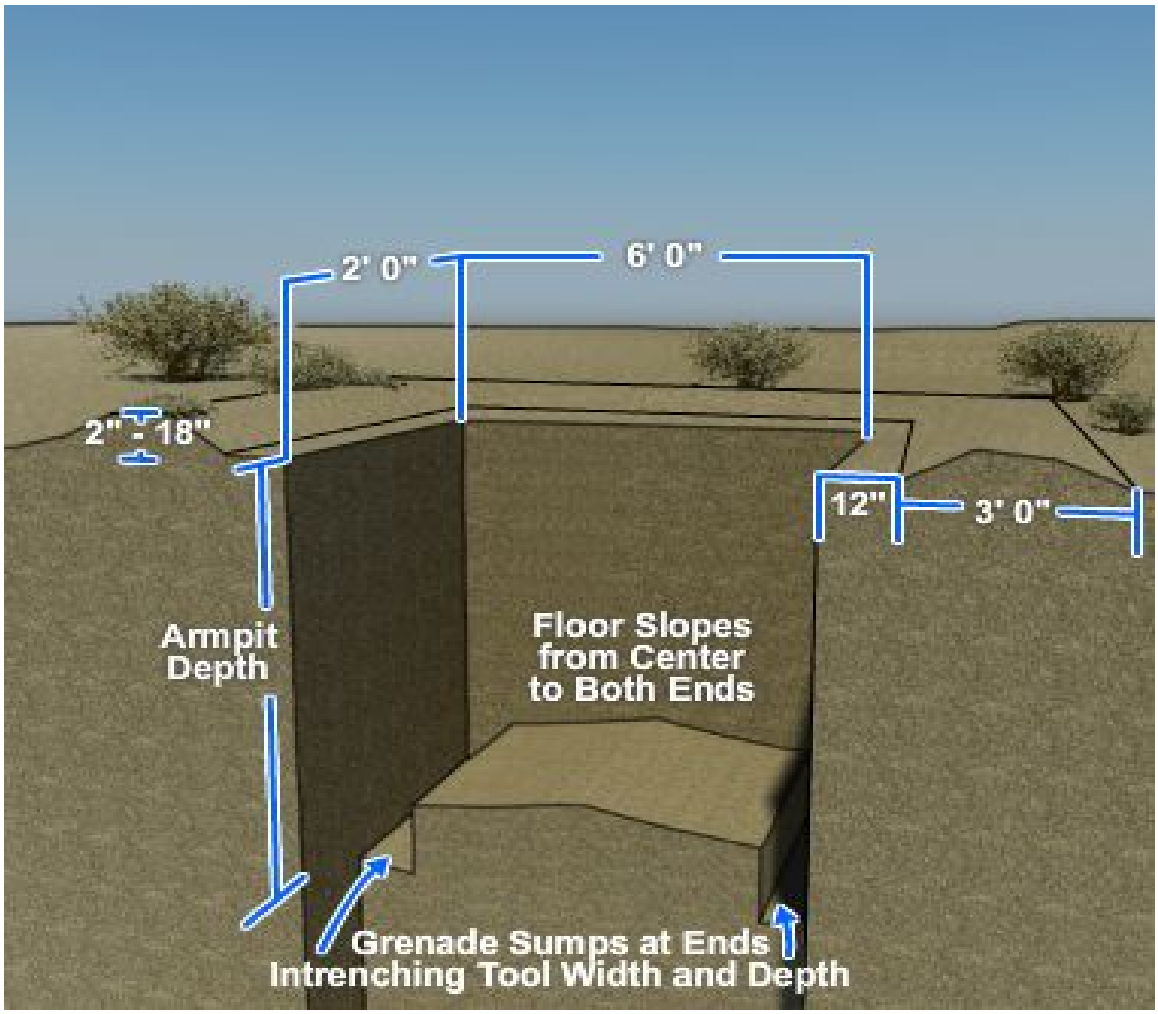


Figure 7-5 — Two-person fighting position.

The types of dug-in cave holes shown in *Figure 7-6* are dug in the side of hills or mountains and are used as a command post for the unit, a machine gun position, or a rifle or light automatic-weapon position. When possible, the entrance to these

emplacements should be concealed and camouflaged. They provide excellent protection from enemy observation and fire.

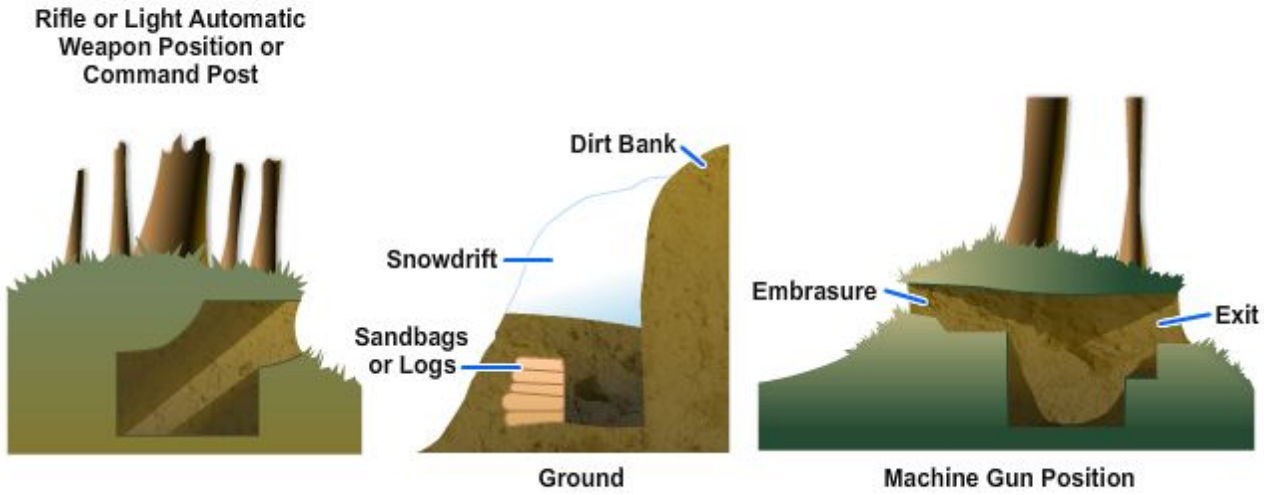


Figure 7-6 — Dug-in cave holes.

A hasty position (*Figure 7-7*) provides protection from small-arms fire, shelling, bombing, and strafing by enemy planes. It is a one-person position and is normally the type of emplacement dug by and for command post personnel.

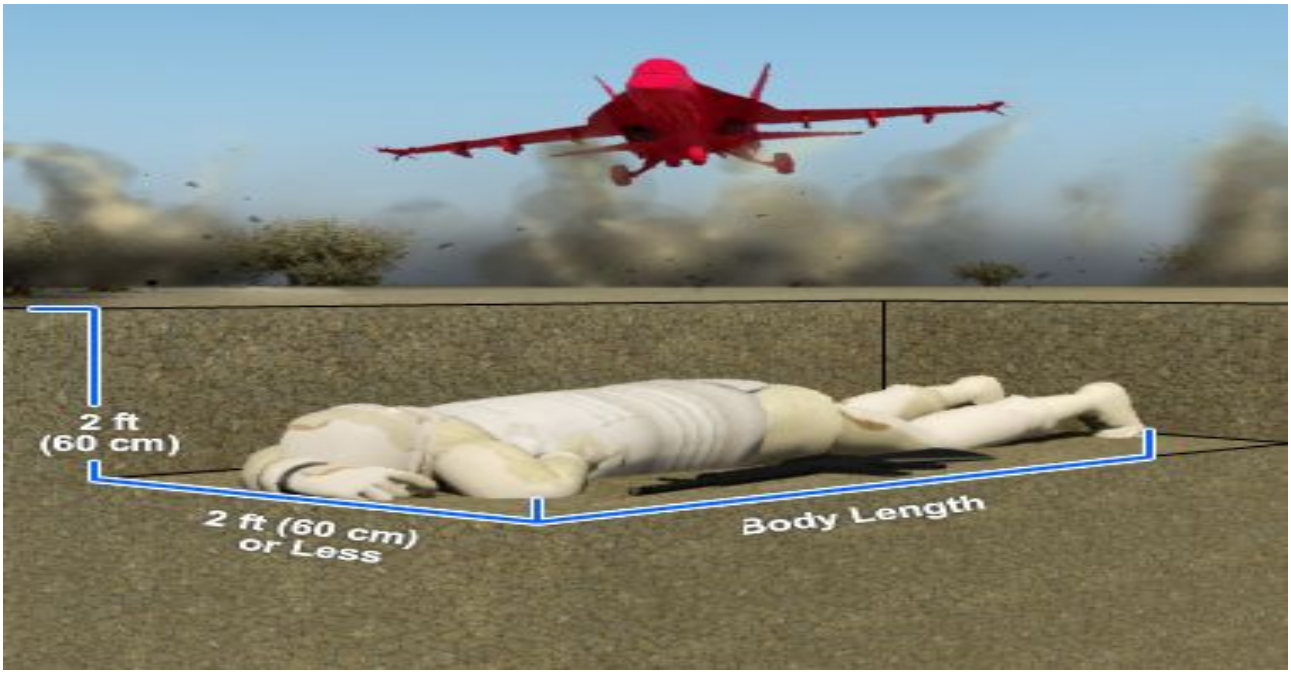


Figure 7-7 — Hasty position.

2.5.0 Temporary Battlefield Positions

Figure 7-8 shows the application of cover and concealment principles in the selection of a temporary battlefield position. The illustrations indicate you should observe and fire around the side of an object, and keep as low as possible to cover and conceal most of your head and body. The illustrations shows a rifleman who is right-handed firing or observing; a rifleman who fires left-handed would observe and fire from the left side of the object they are using for cover and concealment.

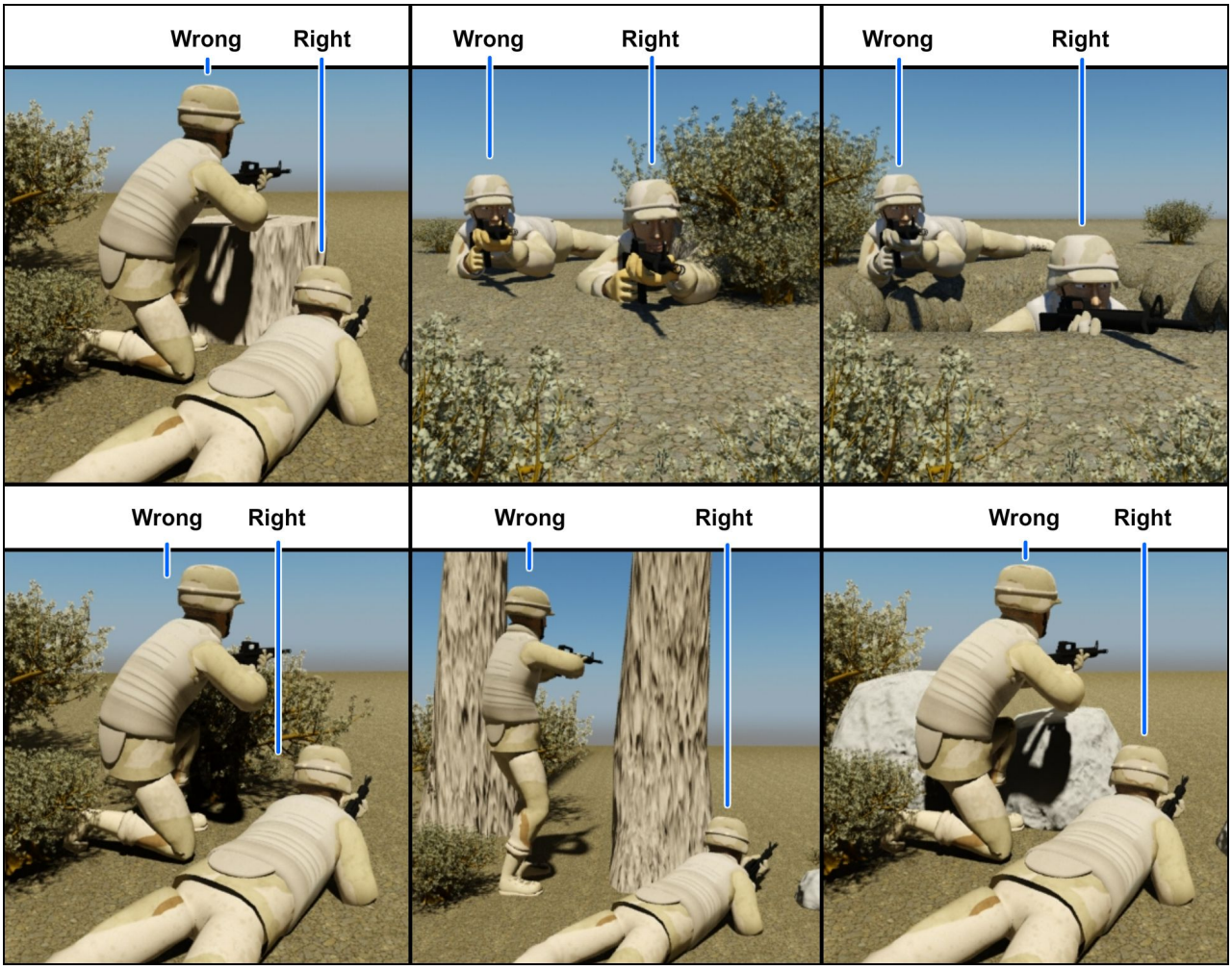


Figure 7-8 — Correct and incorrect battlefield positions.

3.0.0 CONCEALMENT

The first principle of concealment is to avoid all unnecessary movement. You may frequently be in a position where you can escape observation if you remain still, but instantly attract attention if you move. Any movement against a stationary background causes you to stand out very clearly; therefore, if you change position, move carefully (over a concealed route if possible) to the new position.

The second principle is to use all available concealment. Background is important; blend in with it to prevent detection. Trees, bushes, grass, earth, and artificial structures form backgrounds of various colors, and color is a factor in whether or not you will be concealed by blending. Select a background that blends with your uniform and absorbs the outline of your figure. Stay in the shadows whenever possible.

The third principle of concealment is keep low; that is, maintain a crouch or squat—or better still—a prone position. The lower silhouette you present, the more difficult it is for the enemy to see you. Keep off the skyline, even at night.

Finally, expose nothing that shines. Sunlight reflecting off a shiny surface can be seen for a great distance and attracts attention instantly.

4.0.0 CAMOUFLAGE

Camouflage is a general term applied to measures (either natural or artificial) taken to conceal yourself, your position, and your equipment from enemy observation. Three general rules for camouflage are as follows:

1. Take advantage of all available natural concealment.
2. Camouflage by altering the form, shadow, texture, and color of objects.
3. Camouflage against both ground and air observation.

4.1.0 Camouflaging a Position

To avoid detection by the enemy, use the following methods of camouflaging a position:

1. Before constructing your position, study the terrain and vegetation in the area so after your position is completed, by the use of camouflage, you are able to restore the area as near as possible to its original appearance.
2. Do not use more material than you need. Too much camouflage can reveal a position as quickly as too little camouflage.
3. Obtain natural material from a wide area. When you strip a small adjacent area of foliage, the stripped area gives the position away.
4. Always conceal excavated soil by covering it with leaves or grass or by dumping it under bushes, into streams, or into ravines.
5. After camouflaging, inspect the position carefully from the viewpoint of the enemy. Check it repeatedly to ensure that it remains natural in appearance and continues to conceal the position.
6. Practice Camouflage Discipline. Avoid doing anything, such as scattering cans or boxes around the camouflaged position that may give the position away. When possible, use old, established paths to and from your position. Do not create new paths that can be seen from the air. If necessary, vary the route to and from the position so there is no beaten path into the position.

4.2.0 Camouflaging Personal Equipment

The color of field uniforms and web equipment blends well with most terrain unless the equipment is badly faded. If it is faded, color it to blend with the surrounding terrain. When no paint is available; use mud, charcoal, or crushed grass.

Color in bold, irregular patterns. Alter the distinctive outline of your helmet with a cover of cloth or burlap colored to blend with the terrain. Let foliage stick over the edges, but do not use too much of it. Use a camouflage band, string, burlap strips, or rubber bands to hold the foliage in place.

Use mud or dirt to dull shiny surfaces of weapons, being careful not to foul working parts.

4.3.0 Camouflaging the Person

Exposed skin—even dark skin—reflects light. To prevent this, you should use camouflage face paint sticks. They are issued and used in a two-color combination. Although these sticks are called face paint sticks, they are used on any exposed skin and are issued and used in the following combinations:

1. Loam and light green for light-skinned personnel in other than snow regions
2. Sand and light green for dark-skinned personnel in other than snow regions
3. Loam and white for all personnel in snow regions

Apply face paint sticks or other materials as follows:

1. Paint the shiny areas (forehead, cheeks, nose, chin, and exposed skin on the back of your neck and your hands and wrists) with the darker color.
2. Paint the shadow areas (around the eyes and under the nose and chin) with the lighter color.
3. When applying face paint, use the buddy system.
4. When face paint is not available, burnt cork, charcoal, or lampblack may be used.

Mud should be used only when nothing else is available. Mud changes color as it dries, and when dry, it may flake off and leave exposed skin. Also, mud may contain harmful bacteria and should be used only on approval of a medical officer.

4.4.0 Camouflaging of Vehicles

A badly concealed vehicle can lead to much more than just a lost vehicle; it may mean discovery of your unit or complete destruction of an installation. As is always the case in camouflage, the aim should be to occupy a position without altering its appearance. To do this, you should park the vehicle under natural cover whenever available. When cover is inadequate, the vehicles should be parked so their shape will disappear into the surroundings. Better concealment can be obtained by using natural rather than artificial material to break up the shape and shadow of the vehicles. This type of material is always available near a parking site or motor pool and can be erected and removed quickly. When cut foliage is used, be sure it is put up as it was growing because the underside of the leaves is much lighter than the topside, and the difference in color could give your position away. In addition, cut foliage should be replaced as soon as it starts to wither.

The principal artificial materials used to conceal vehicles are drape nets. They are easy to use, quickly erected, and quickly removed. Drape nets give complete concealment against direct observation, but, as with most artificial camouflage materials, they can frequently be detected by photographic observation because they often fail to blend with the background properly. In any case, drapes do conceal the identity of a vehicle, even though the drape net itself may be detected.

4.5.0 Camouflaging of Buildings

The basic methods of concealment (blending, hiding, and deceiving) can be applied either to existing buildings or new construction. However, concealment is much easier when the camouflage scheme is incorporated into the designs for new construction and site selection.

Buildings can be concealed by screens of garnished nettings. Another method is to have disruptive patterns painted over the netting, roof, and gable-end walls. Where concealment from close observation is required, the netting should be sloped gradually to the ground. For structures with roofs steeper than 30 degrees, the netting must cover the whole building.

When the terrain permits, a new structure can be partially dug-in to the ground. This will reduce the structure's height and, in turn, its shadows. The nature and size of buildings can be disguised in many ways, such as the following:

1. Place trees between the buildings.
2. Paint the roofs to match the surrounding terrain.
3. Vary roof lines with wooden framework, then cover them with burlap or fine-mesh wire netting to simulate sloping hip roofs.
4. Erect superstructures over existing buildings and cover them with burlap, plastic, or other material to alter their appearance so they resemble the surrounding native buildings.

4.6.0 Camouflaging of Supply Points

From a camouflage viewpoint, the large concentration of materials is the main problem. Huge amounts of equipment and supplies of all kinds are usually brought up at the same time. They must be unloaded and concealed quickly and yet be easily accessible for redistribution. Therefore, natural cover and concealment must be used at supply points whenever possible. Dispersal of these supplies is necessary to minimize damage from a single attack. Existing overhead cover should be used when new access roads are planned. When the supply point is to be permanent, the tracks running in and out of the installation can be concealed by overhead nets slung between trees. Traffic control should include measures to conceal activity and movement at, to, and from the installation. When natural cover is sparse or nonexistent, be sure the natural terrain features are used to advantage.

Maintain camouflage discipline at supply points including a minimum of changes in the appearance of the terrain. Control the debris so it does not accumulate and attract enemy attention.

4.7.0 Camouflaging of Water Points

Water points must have adequate concealment—either artificial or natural—for operating personnel, storage tanks, pumping, and purification equipment. When the surrounding terrain foliage is not thick enough for perfect concealment, natural or artificial camouflage materials can supplement it.

To keep the enemy from observing the shine of water in the tanks, place canvas covers or natural foliage over them. By using foliage or artificial materials, you can distort their features.

Small, open areas that must be crossed by vehicles or personnel operating in the area can be concealed with natural or artificial materials.

A water supply schedule must be instituted and maintained. Without camouflage discipline or with a violation of the schedule, a concentration of waiting vehicles that cannot be readily concealed could occur and be seen by the enemy.

Summary

In this chapter, you were introduced to the fundamentals of cover and concealment. Remember the difference, concealment will help you remain undetected, but only cover will protect you from rounds or shrapnel. When concealing from the enemy, don’t make a silhouette against the background. Rising up above a ridgeline or another area would make you a perfect a target for the enemy. Make sure you provide proper camouflage for your vehicles, building, supply transfer stations, and water points. Remember your different types of fighting emplacements, how to build them, and their proper use. They may mean the difference between coming home alive or not.

Assignment 7

Objectives

1. Specify the principles of cover and concealment and their application in construction of a fighting emplacement.
2. Specify the principles of camouflage and the methods of camouflaging a temporary battlefield position, yourself, your equipment, buildings, and supply points.

Questions

1. What position(s) will protect you the most against flat trajectory fire?

    1. Skirmishers trench
    2. Ravines and hollows
    3. A one-person fighting hole
    4. A two-person fighting hole

2. When searching for a combat position, one that provides the best protection would have what characteristics?

    1. Maximum cover
    2. Maximum concealment
    3. Maximum cover maximum concealment
    4. Minimum cover maximum concealment

3. What is the best action to take as a means of covering and concealing most of your head and body while occupying a temporary battlefield position?

    1. Maintain a high profile
    2. Choose a position close to a river
    3. Observe the enemy and keep silent
    4. Observe and fire around the sides of objects

4. What is the first principle of concealment?

    1. Keep low
    2. Move only when necessary
    3. Expose nothing that shines
    4. Use all available concealment

5. A fresh soil parapet or ridge around a fighting emplacement should have what approximate dimensions?

    1. 1 foot high and 3 feet wide
    2. 2 feet high and 4 feet wide
    3. 6 inches high and 3 feet wide
    4. 6 inches high and 4 feet wide

6. What is the simplest type of dug-in emplacement?

    1. A camouflaged fighting hole
    2. A skirmisher's trench
    3. A cut-timber revetment
    4. A cave hole

7. What is the purpose of camouflaging?

    1. To keep the enemy from seeing you, your position, or your equipment
    2. To keep the enemy from firing on you or your position
    3. To afford protection against small-arms fire
    4. To afford protection against the effects of aerial bombs

8. The web equipment of your personal combat gear has faded and no camouflage paint is available. In what way could you camouflage your equipment using mud?

    1. Make irregular patterns that blend with the terrain around you
    2. Make regular patterns that contrast with the terrain around you
    3. Spray a thin layer of mud evenly over all your equipment
    4. Place patches of mud in sporadic locations

9. What is the recommended practice for applying loam and light green paint?

    1. Paint shiny areas with loam and shadow areas with light green paint
    2. Paint shiny areas with light green paint and shadow areas with loam
    3. Paint hands with light green paint and wrists with loam
    4. Paint hands with loam and wrists with green paint

10. Mud should only be used to substitute for face paint when approved by whom?

    1. Medical Officer
    2. Commanding Officer
    3. Watch Officer
    4. Company Chief

11. When netting is used to camouflage a building, it should be placed over the whole building when the roof is steeper than how many degrees?

    1. 10
    2. 20
    3. 30
    4. 40

12. What method aids in maintaining the camouflage discipline at supply points?

    1. Maximize traffic into one area
    2. Minimum of changes in the appearance of the terrain
    3. Clutter the area with debris or trash
    4. Centralize all vehicles in one location

ASSIGNMENT 7

Individual Protective Measures

Directions: Select the correct answer from the list of alternates below each question in the end of chapter assignment. Write in the answer next to the corresponding question number below. Use this answer sheet as a reference to completing the online assignment related to this assignment.

1.	
2.	
3.	
4.	

5.	
6.	
7.	
8.	

9.	
10.	
11.	
12.	

Additional Resources and References

This chapter is intended to present thorough resources for task training. The following reference works are suggested for further study. This is optional material for continued education rather than for task training.

Combat Skills of Soldier, U.S. Army Field Manual (FM) 21-75.

Survivability, U.S. Army Field Manual (FM) 5-103.

Civil Engineer Guide to Fighting Positions, Shelters, Obstacles, and Revetments, Air Force Handbook (AFH) 10-222, Volume 14.

Trainee Feedback

Center for Seabees and Facilities Engineering (CSFE) makes every effort to keep their courses up-to-date and free of technical errors. If you have a suggestion, found an error or inaccuracy, please write, FAX or email us by using the form below. Use one form for each comment and be sure to fill in the information as accurately and detailed as possible. Thank you for your assistance.

Write: CSFE
NCF Training Division (N7B)
3502 Goodspeed St.
Port Hueneme, CA 93043-4337

FAX: (805) 982-5508 / DSN 551-5508

E-mail: CSFE_CBCH@navy.mil

Trainee Feedback Form

Course: Seabee Combat Handbook, Volume ____, NAVEDTRA: _____

Course Date: _____ Chapter Number: _____ Page: _____

Paragraph: _____ Sentence: _____ Figure: _____ Frame/View: _____

Description: _____
_____
_____
_____
_____
_____

(optional) Corrective action: _____
_____
_____

(optional) Supporting reference(s): _____
_____

Your email address, if a response is requested: _____

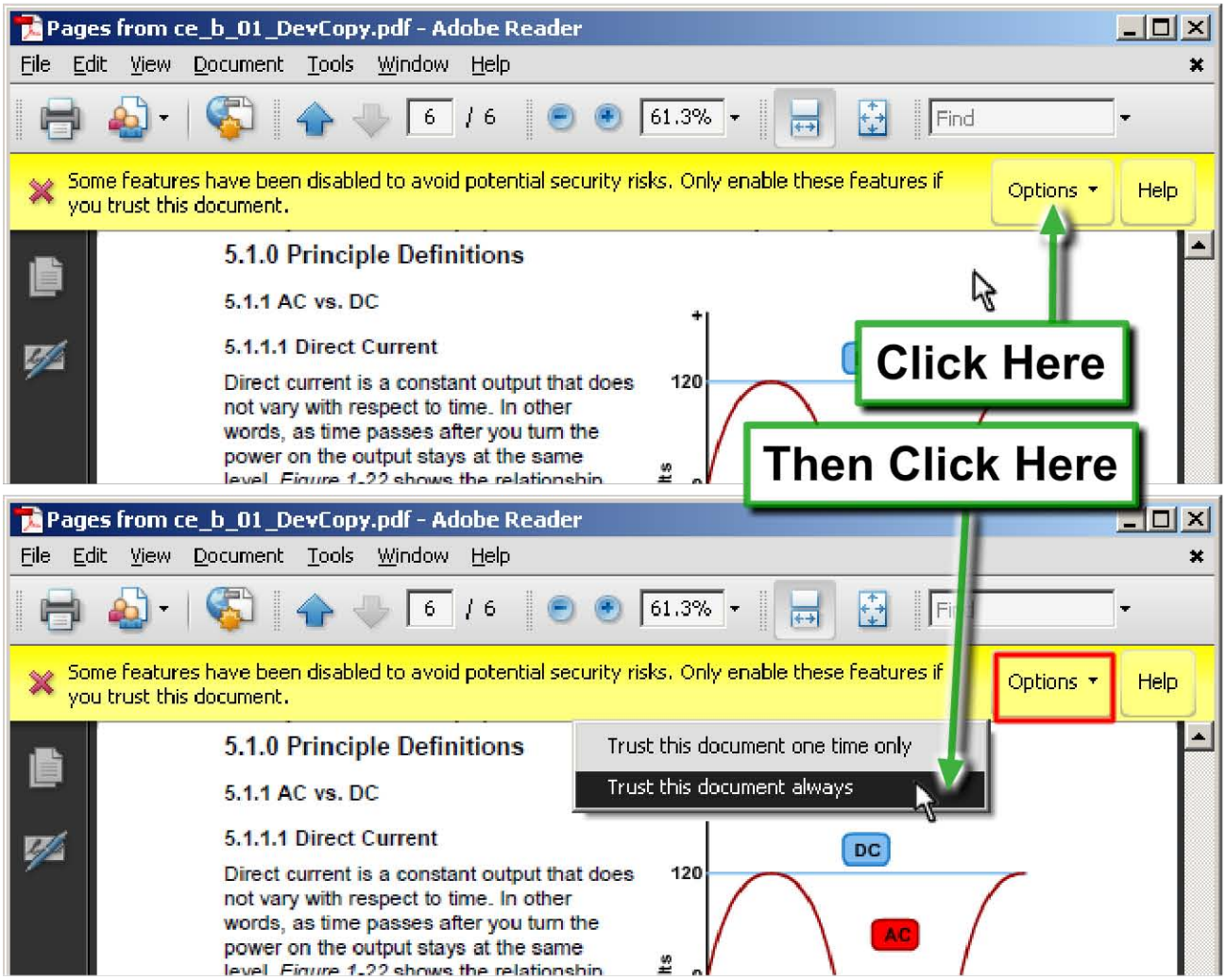
The Interactive features of this manual are currently disabled.

Many graphics will not appear correctly unless these features are turned on. You should either see a popup window, or a yellow banner at the top of the application. To enable the Interactive features of this manual follow the steps illustrated below:

If you see a popup window do the following:



If you see a yellow banner, do the following:



Once you have completed either of the above procedures the features will be enabled for this document, and this warning won't appear again after you leave this page.

Chapter 8

Entanglements

Topics

1.0.0 Barbed Wire Entanglements

2.0.0 Concertina Fencing Entanglements

To hear audio, click on the icon: 

Overview

In this chapter, you will be introduced to the different types of entanglements available and utilized by the Seabees. You will learn about the different characteristics of each type of entanglement. The placement and removal of each one will be covered as well. Learning how to properly set and remove the entanglement is important for the security of you and your fellow Seabees.

Objectives

When you have completed this chapter, you will be able to:

1. Identify design features of wire entanglements and recognize their construction and handling procedures.

Prerequisites

There are no prerequisites for completing this manual.

Features of this Manual

This manual has several features which make it easy to use online.

- Figure and table numbers are italicized within the handbook text. Figure and table reference numbers are conveniently located next to (or near) the applicable handbook text.
- Audio and video clips are included in the text, with italicized instructions telling you where to click to activate the appropriate link.
- Review questions are included at the end of this chapter as the chapter assignment. To submit assignments log into https://www.courses.netc.navy.mil, go to “Student Services”, in the drop down click on “Active Courses”, go to "View/Submit Answers" next to the course you wish to submit answers for. Assignments may be submitted to the above Web site as they are completed, and instant scoring is available. Your completion letter is available as soon as you pass all assignments.
- A form at the end of each chapter allows your input for improving the manual or correcting errors to be brought to the attention of CSFE’s Technical Review Committee. Your input is important and will help keep this manual up to date and free of technical errors.

1.0.0 BARBED WIRE ENTANGLEMENTS

Barbed wire entanglements are artificial obstacles designed to slow the movement of foot troops and, in some cases, tracked and wheeled vehicles. The materials used in constructing barbed wire entanglements are relatively lightweight and inexpensive, considering the protection they afford. Barbed wire entanglements can be breached by gunfire but they are built, repaired, and reinforced rapidly.

1.1.0 Site and Layout

To be effective, you should select the site and lay out barbed wire entanglements to meet the following requirements:

1. Perform the work under friendly observation, covered by fire, and where practical, protected by antipersonnel mines, trip flares, and warning devices.
2. Conceal the entanglements from enemy observation as far as practical by incorporating terrain features, such as reverse slopes, hedges, woods, paths, and fence lines.
3. Erect them in irregular and nongeometrical traces.
4. Use them in bands or zones wherever practical.
5. Coordinate the entanglements with other elements of the defense.

1.2.0 Classification

You should classify entanglements according to use and depth; and whether they are fixed or portable. They are classified by use as tactical, protective, or supplementary. The use of these types of entanglements in a defensive area is shown schematically in *Figure 8-1*.

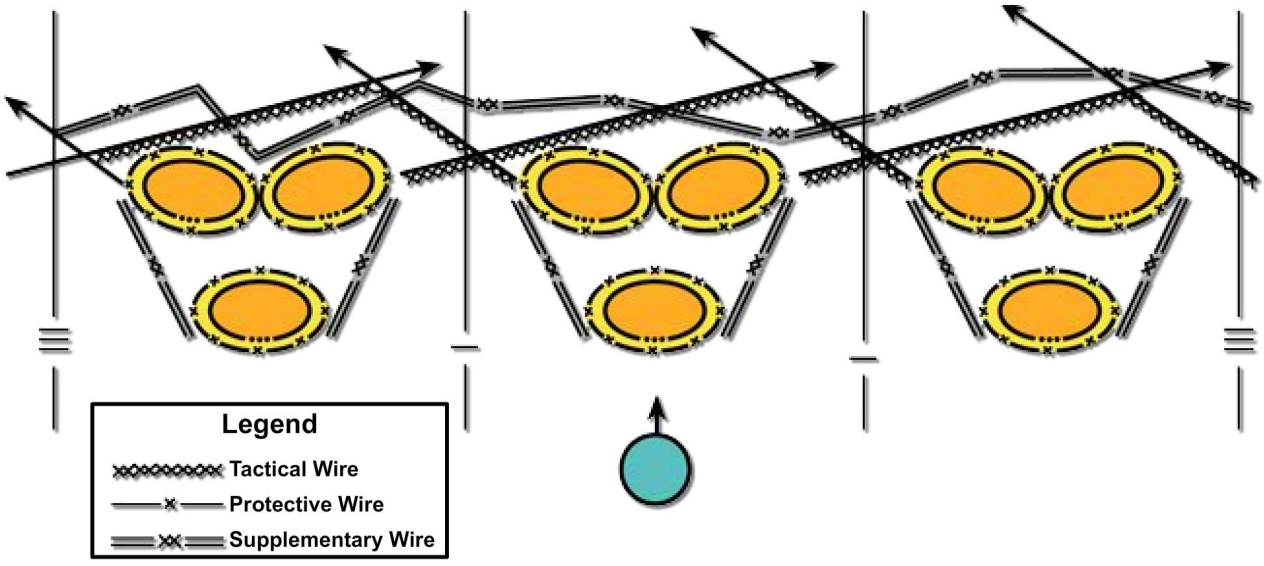


Figure 8-1 — Schematic layout of barbed wire entanglements in a defensive area.

1.2.1 Tactical Wire Entanglements

Establish tactical wire entanglements parallel to and along the friendly side of the final protective line. Use them to break up enemy attack formations and to hold the enemy in areas covered by the most intense defensive fire. Extend tactical entanglements across the entire front of a position, but there is no need to make them continuous.

1.2.2 Protective Wire Entanglements

Locate protective wire entanglements to prevent surprise assaults from points close to the defense area. As with all antipersonnel obstacles, they are close enough to the defense area for day and night observation. They are also far enough away to prevent the enemy from using hand grenades effectively from points just beyond the obstacle—normally 131 to 328 feet. Surround the individual units of a command—usually the platoon (*Figure 8-1*) — with protective wire. Connect these entanglements to entanglements around other platoons by supplementary wire to enclose the entire defensive positions. Erect protective entanglements around rear-area installations in the same manner to serve the same purpose as protective wire around defensive positions in forward areas. You should also include the entanglements of protective wire over the tops of installations provided with overhead cover (*Figure 8-2*).

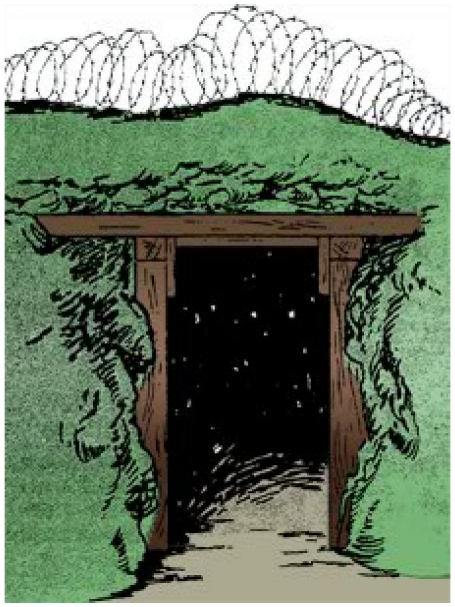


Figure 8-2 — Protective wire on top of an overhead cover.

1.2.3 Supplementary Wire Entanglements

Use supplementary wire entanglements in front of the Forward Line Of Troops (FLOT) to conceal the exact line of the tactical wire. To the rear of the FLOT, use supplementary wire to enclose the entire defensive position by connecting the protective-wire entanglements. Use supplementary wire entanglements to break up the line of tactical wire. These supplementary wire entanglements should be identical to the tactical wire entanglements and constructed simultaneously with them whenever possible similar to those shown in *Figure 8-3*.

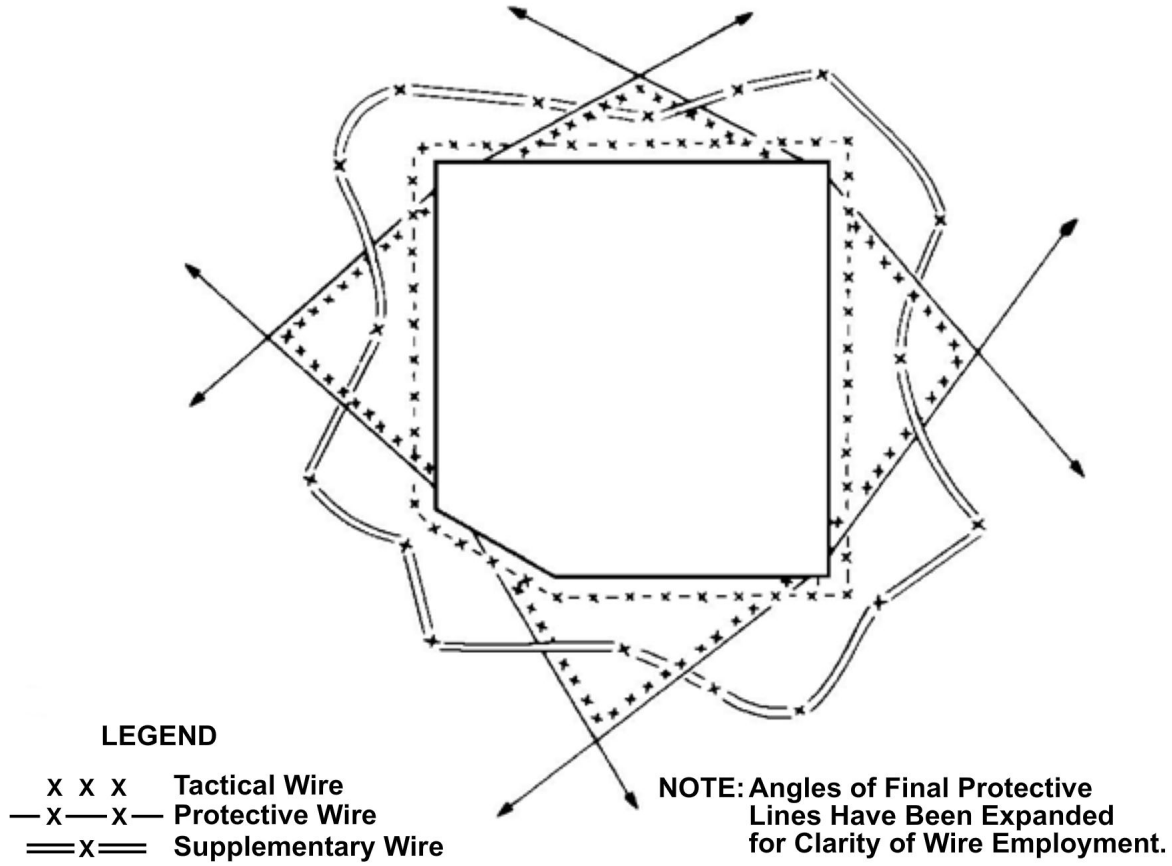


Figure 8-3 — Perimeter wire defense.

1.2.4 Depth of Entanglements

Entanglements are classified by depth. The depth is broken down into three types, a belt, band, or a zone.

- A BELT is an entanglement “one fence” in depth.
- A BAND consists of two or more belts in depth, with no interval between them. The fences may or may not be of the same type.
- A ZONE consists of two or more bands or belts in depth with intervals between them.

1.2.5 Equivalent Effectiveness

Entanglement depths are specified in terms of comparative effectiveness. Tactical wire entanglements have an equivalent effectiveness to three belts of 4 and 2 pace double apron fence whenever possible. Protective wire used in any type of entanglements has an equivalent effectiveness at least to the equivalent of the 4 and 2 pace double apron fence. Use supplementary wire with an effectiveness equivalent to that of the type of wire it supplements. It should be equivalent to tactical wire or equivalent to the type of protective wire being used if it connects the outer perimeters of protective wire at the flanks and rear.

1.2.6 Portability

By definition, fixed entanglements are erected in place and they **CANNOT** be moved unless completely disassembled.

Portable entanglements, however, can be moved without complete disassembly. Portable entanglements have been developed for one of the following reasons:

- To permit assembly in rear areas with ease of transportation and rapid installation in forward positions
- For the temporary closing of gaps or lanes that can be reopened quickly for patrols or counterattacking forces

1.2.7 Lanes and Gaps

Lanes and gaps provide for the passage of patrols, working parties, and attacking or counterattacking forces. When they are not in use, keep them closed with portable obstacles covered by fire. In barbed wire zones, stagger lanes and gaps in a zigzag pattern.

1.3.0 Uses of Barbed Wire Entanglements

The uses of Barbed wire entanglements has been proven to be very effective for the purposes of an outpost area, battle position, artillery and reserve area, antipersonnel obstacles, roadblocks, and for strengthening natural obstacles.

1.3.1 Outpost Area

Surround combat outposts with wire entanglements. Site these entanglements carefully to serve as both protective and tactical wire, and cover them by small arms fire. Supplement the wire obstacles with antipersonnel mines, warning devices, and booby traps.

1.3.2 Battle Position

In the battle area, surround each company defense position with a wire entanglement that is connected laterally across the front of the entanglements surrounding the other units in the position.

1.3.3 Artillery and Reserve Area

Use wire entanglements in the outer protection areas of howitzer positions. Similarly, protect heavier weapons, reserve area shelters, and other installations in the reserve area if justified by the situation.

1.3.4 Antipersonnel Obstacles

Situate barbed wire entanglements, trip flares, noisemakers, and antipersonnel mines to detect enemy patrol action or infiltration at night; to prevent the enemy from delivering a surprise attack from positions close to the defenders; and to hold, fix, or delay the enemy in the most effective killing ground. Site such obstacles near enough to defensive positions for adequate surveillance by the defenders by night and day and far enough away to prevent the enemy from using hand grenades against the defender from points just beyond the obstacles.

1.3.5 Roadblocks

Figure 8-4 shows a series of barbed wire concertinas that will stop wheeled vehicles. Use a series of these blocks placed about 33 feet apart. Wire together the ends of the adjacent coils and lightly anchor at the sides of the road. Position the block to achieve surprise.

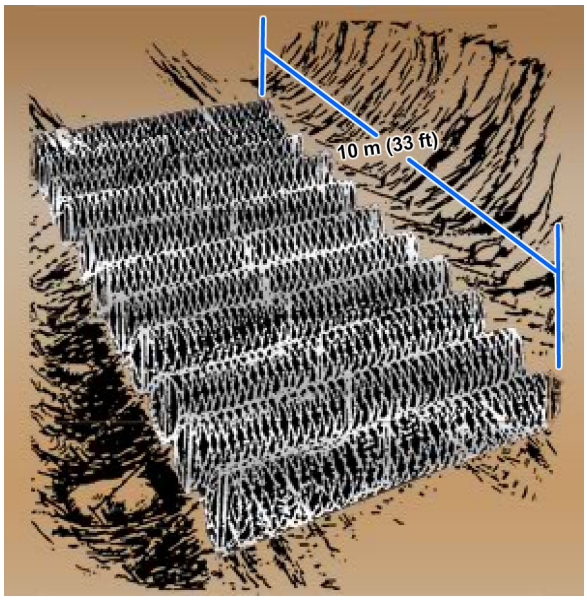


Figure 8-4 — Concertina roadblock.

1.3.6 Strengthening Natural Obstacles

Deep rivers, canals, swamps, and cliffs are effective delaying obstacles to infantry. Thick hedgerows, fences, and woods can slow troops to a lesser degree. You can improve both of them by lacing the obstacles with barbed wire, by the addition of parts of standard fences on one or both sides, or by entangling with loose wire.

1.4.0 Standard Barbed Wire

Standard barbed wire (*Figure 8-5*) is a two-strand twisted No. 12 steel wire with four-point barbs at 4-inch intervals.



Figure 8-5 — Standard barbed wire.

1.4.1 Handling

When handling barbed wire, wear the standard barbed wire gauntlets shown in *Figure 8-5* or heavy leather gloves. They permit faster work and protect against cuts and scratches. As an added safety precaution, grasp the wire with your palms down.

1.4.2 Issue

Barbed wire is issued in reels (*Figure 8-6*), containing about 1,312 feet of wire. The wire weighs 90 pounds and the reel about 1.3 pounds. For safety reasons, it should be carried by two Seabees.

1.4.3 Bobbins

Bobbins (*Figure 8-7*) holding about 98 feet of wire are prepared, normally in rear areas, for use in building short lengths of fence and in repairing entanglements. Bobbins require two Seabees to handle safely. One unwinds the bobbin and the other installs the wire. Two or more Seabees can make the bobbins by following these steps:

1. Prepare the bobbin sticks.
2. Rig the reel on an improvised trestle or other support.
3. Unroll and cut 98-foot lengths of wire, fastening one end of each to the trestle.

4. Wind the wire in a figure eight shape on the bobbin sticks.
5. Tie a piece of white tracing tape to the loose end of the wire to facilitate finding it.



Figure 8-6 — Barbed wire reel.

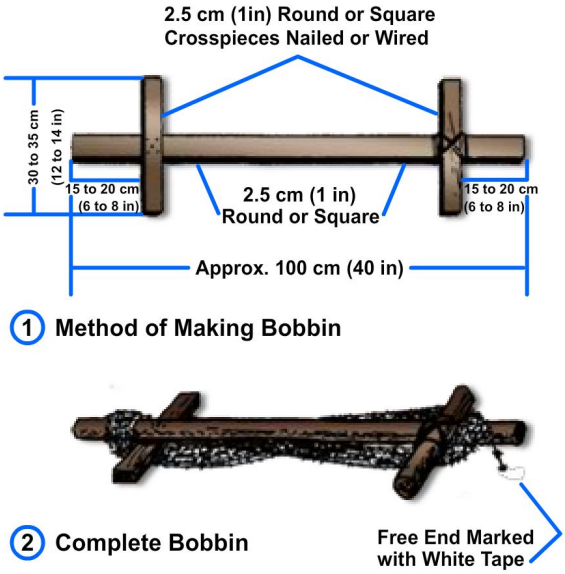


Figure 8-7 — Barbed wire bobbin.

1.5.0 Barbed Steel Tape

The physical characteristics of barbed steel tape (*Figure 8-8*) are as follows:

- Width: 3/4 inch
- Thickness: 0.022 inch
- Weight: 34 pounds/164 feet
- Width of barb: 7/16 inch
- Interval between barbs: 1/2 inch
- Breaking load: 500 pounds

Two significant characteristics listed above that are important to field users are the weight and the breaking load.

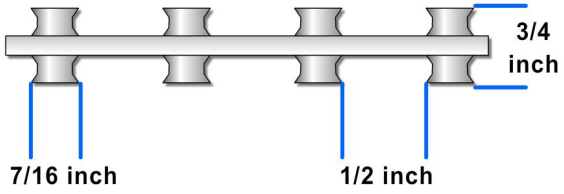


Figure 8-8 — Barbed tape.

1.5.1 Handling

In handling barbed tape, use heavy barbed tape gauntlets instead of the standard gauntlets (*Figure 8-9*). Small metal clips on the palm and fingers prevent the barbs of the tape from cutting the leather. Barbed tape is lightweight and compact, and it is much easier to handle, store, and transport than barbed wire.

1.5.2 Issue

The barbed tape is issued in a 164-foot reel that weighs 34 pounds. There are six reels to a cardboard carrying case.

1.5.3 Barbed Tape Dispenser

A dispenser (*Figure 8-9*) is required to install barbed tape. It consists of a frame to hold the 164-foot reel of barbed tape and two sets of rollers. Insert the reel on the spindle and thread the tape through the two sets of parallel rollers. Then turn the outside set of rollers 90 degrees in a clockwise direction. Now close the hinged arm of the frame and lock it in place by the frame of the rotating rollers. As the tape unwinds from the reel, the two sets of rollers oriented 90 degrees to each other impart a twist to the tape. For it to be effective, you must twist the barbed tape as it is installed.

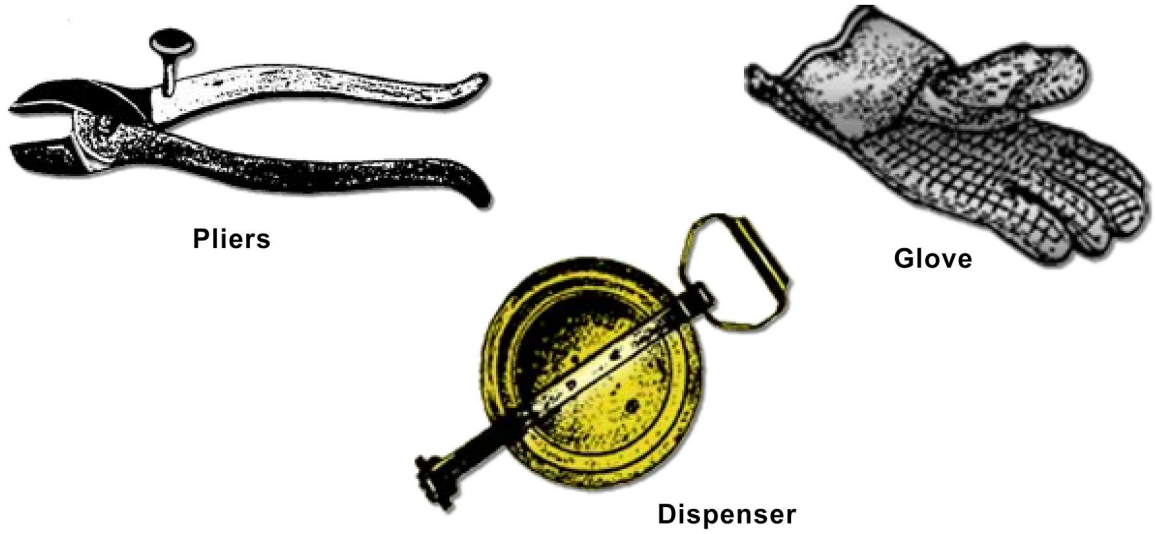


Figure 8-9 — Barbed tape equipment.

1.5.4 Uses

You can use barbed tape in place of standard barbed wire in most cases except when it is to be repeatedly recovered and reused. The most effective fence you can construct using barbed tape is the “double apron fence.”

1.5.4.1 Advantages of Barbed Tape

The principal advantages of barbed tape are its size and weight. For equal lengths, barbed tape occupies a third of the space and weighs a third as much as standard barbed wire. A double apron fence constructed with barbed tape is more difficult to breach by crawling through than one constructed with standard barbed wire because the barbs of the barbed tape are closer together. Because of the flat configuration, it is more difficult to cut barbed tape with wire cutters.

1.5.4.2 Disadvantages of Barbed Tape

At the present time, the major disadvantage of barbed tape is its breaking strength. Standard barbed wire is twice as strong. Installation of barbed tape requires a dispenser. A major problem could arise if the dispenser is not available. The tape is not recoverable to its original condition. However, it may be recovered on bobbins in a twisted condition. Shell fragments more easily cut barbed tape than standard barbed wire. Barbed tape can also be cut with a bayonet.

1.5.5 Double Apron Fence

The standard double apron fence is one of the best obstacles that can be made with barbed tape. The effectiveness of this obstacle is increased by (1) raising the top wire to preclude crossing the obstacle by stepping over it and (2) placing low wires 4 inches above the ground to prevent personnel from crawling under the obstacle.

1.5.6 Tying Procedures

In tying barbed tape, wrap the tape around the post, since the sharp bends of other ties weaken the tape. Steel wire rings, crimped on, provide effective ties and may be used where available.

1.5.7. Splices

Connecting slots at each end of a 164-foot reel provide a quick method of splicing reels of barbed tape (*Figure 8-10*). You can also splice barbed tape by interlocking the twisted barbs of two separate lengths, then completing the splice by affixing one steel wire ring to each end of the area where spliced.



Figure 8-10 — Splicing barbed steel tape.

1.6.0 Metal Pickets

Metal pickets are issued in two types: screw and U-shaped. The standard lengths are short (or anchor), medium, and long. The U-shaped picket also comes in an extra-long length. Pickets that are serviceable can be recovered and used again.

Interaction Available

1.6.1 Screw Pickets

Drive the screw picket (*Figure 8-11*), into the ground by turning it in a clockwise direction using a driftpin, stick or another picket inserted in the bottom eye of the picket for leverage. Use the bottom eye in order to avoid twisting the picket. Install screw pickets so the eye is to the right of the picket, as seen from the friendly side, and standard ties can be made easily. Screw pickets tend to be less rigid than other types but are desirable because you can install them rapidly and silently. When silence is necessary, wrap the driftpin used in installing the pickets with cloth.

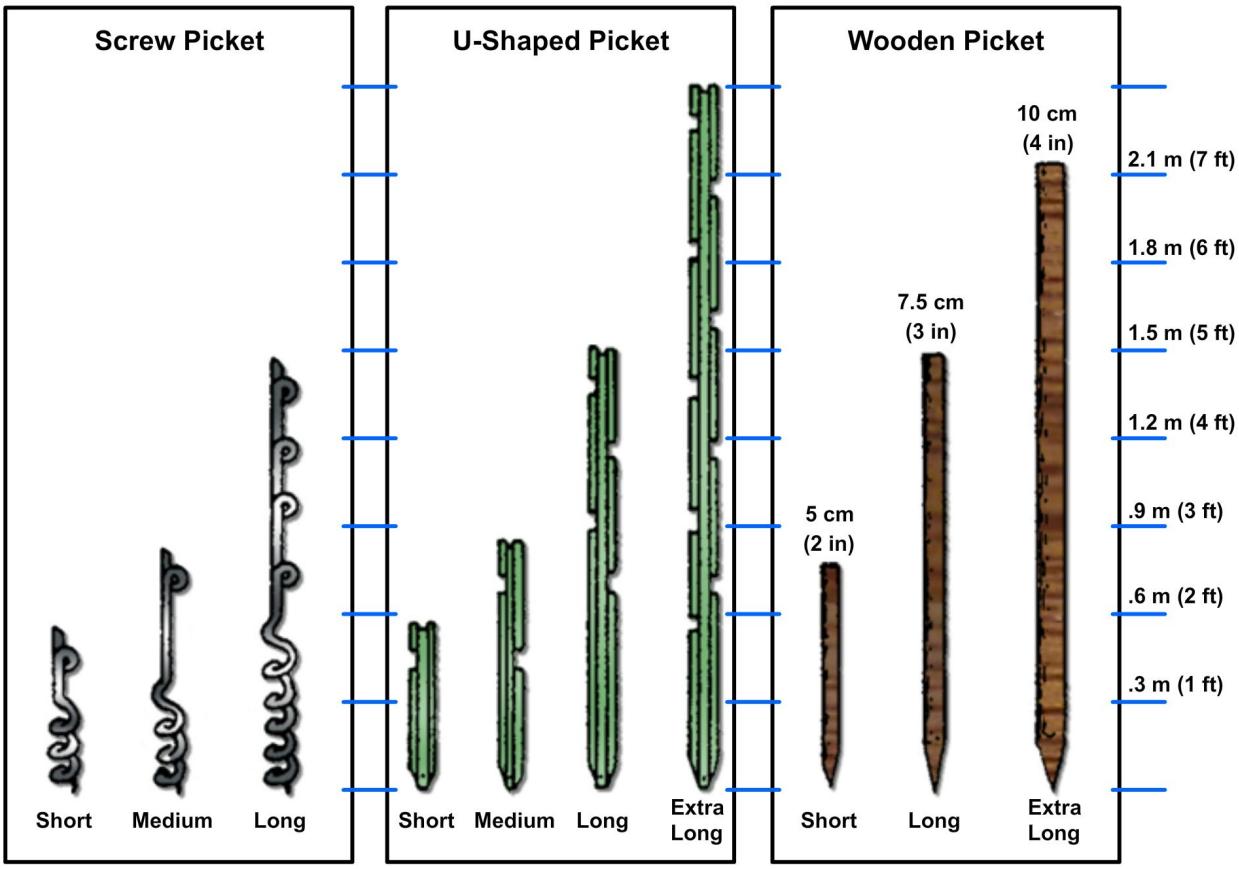


Figure 8-11 — Pickets for use with barbed wire.

1.6.2 U-shaped Pickets

The U-shaped picket (*Figure 8-11*) is a cold formed steel picket with a U-shaped cross section, pointed at one end for driving. It is notched for wire ties and the pointed end has a punched hole for wires used in bundling the pickets. Drive the U-shaped pickets with a sledgehammer. Use a stake-driving cap on the tip of the picket to prevent the sledge from deforming it. Driving the pickets is noisier than installing screw pickets. However, you can reduce the noise by placing a piece of rubber tire over the driving face of the sledge. The pickets are rigid and sturdy when installed properly. They are preferable to screw pickets in situations where noise is not a disadvantage and time is available. Drive the pickets with the hollow surface (concave side) facing the enemy, so friendly small-arms fire will not ricochet back toward your position. An expedient picket driver is shown in *Figure 8-12*. It weighs approximately 5 1/2 pounds and is operated by two people. One person holds the picket in a vertical position, and the other slides the driver over the picket and drives it into the ground to the required depth. Drive short pickets by turning the picket driver upside down and using the head as a hammer. Use the bucket of a front-end loader to push U-shaped pickets into the ground when the tactical situation permits the use of equipment.



Figure 8-12 — Expedient picket driver.

In locations where frozen ground prevents driving of the U-shaped pickets, use an Arctic adapter. The adapter is made of steel and consists of a baseplate equipped with an adjustable channel receptacle and two anchor pins. Anchor it by driving the anchor pins through holes in the baseplate into the ground. One anchor-pin drive sleeve is provided with each 20 adapters to aid anchor pin emplacement. When adapters are not available, you can start a hole with a picket. The picket can be frozen in place by pouring water and snow into the hole.

1.7.0 Wooden Pickets

Make wooden pickets from cut round poles, 4 inches in diameter to standard picket lengths; sharpen them on one end; and drive them with a maul. Use the pickets without peeling the bark to prevent the wire from sliding on the picket and to simplify camouflage. Longer pickets are required in loose or sandy soil and when driving through a snow cover. Driving wooden pickets is not as noisy as driving steel pickets, and the noise can be further reduced by fastening a section of tire tread over the face of the hammer or maul. For driving in hard earth, the picket tops should be wrapped with wire to avoid splitting. Hardwood pickets, properly installed, are sturdy and rigid.

You can use dimensional lumber that is ripped to a square cross section instead of round poles. This is equally satisfactory except that it is more difficult to camouflage. These pickets may be dipped in camouflage paint before driving. Standing trees and stumps may be used as pickets when their location permits.

Table 8-1 portrays the information for the materials needed to make different styles of barbed wire entanglements.

Table 8-1— Materials Used in the Construction of Barbed Wire Entanglements

Material	Approximate Weight		Approximate Length		No. Carried by one person	Approximate weight of load	
	kg	lb	meters	feet		kg	lb
Barbed wire reel	41.5	91.8	400	1312	1/2	21	46
Bobbin	3.5-4.0	7.7-8.8	30	98	4-6	14.5-24.5	32-54
Barbed tape dispenser	0.77	1.7	0.45	1.5	20	15.5	34
Barbed tape carrying case	14.5	31.9	300	984	1	14.5	32
Standard barbed tape concertina	14	31.8	15.2	50	1	14	31
Standard barbed wire concertina	25.4	55.8	15.2	50	1	25	55
Expedient barbed wire concertina	13.5	29.7	6.1	200	1	13.5	30
Screw pickets							
Long	4	8.8	1.6	5.25	4	16.3	36
Medium	2.7	5.9	0.81	2.66	6	16.3	36
Short	1.8	3.9	0.53	1.75	8	14.5	32
U-Shaped pickets							
Extra Long	7.25	16	2.4	7.9	3-4	21.8-29.0	26-64
Long	4.5	9.9	1.5	4.9	4	18.1	40
Medium	2.7	5.9	0.81	2.66	6	16.3	36
Short	1.8	3.9	0.61	2	8	14.5	32
Wooden pickets							
Extra Long	7.7-10.5	16.9-23.1	2.13	7	2	15.4-20.8	34-46
Long	5.4-7.25	11.8-15.9	1.5	4.9	3	16.3-21.7	36-48
Short	1.4-2.7	3-5.9	0.75	2.5	8	11.0-21.7	24-48

2.0.0 CONCERTINA FENCING ENTANGLEMENTS

The standard BARBED WIRE concertina (*Figure 8-13*) is a commercially manufactured barbed wire obstacle made of a roll of single strand, high strength, spring steel wire with four-point barbs attached at 2-inch intervals. Wires forming the coils are clipped together at intervals so the concertina opens to a cylindrical shape 16.4 to 50 feet long (depending on structure and build of opening) and 3 feet in diameter. The 16.4-foot length prevents smaller enemy personnel from crawling through the wire because the coils are closer together. Tanglefoot (discussed later in this chapter) should be used in conjunction with the wire to further increase the effectiveness of the barrier. The concertina is opened and collapsed easily, and it can be used repeatedly. The wire is much harder to cut than standard barbed wire. The concertina weighs about 55.8 pounds.

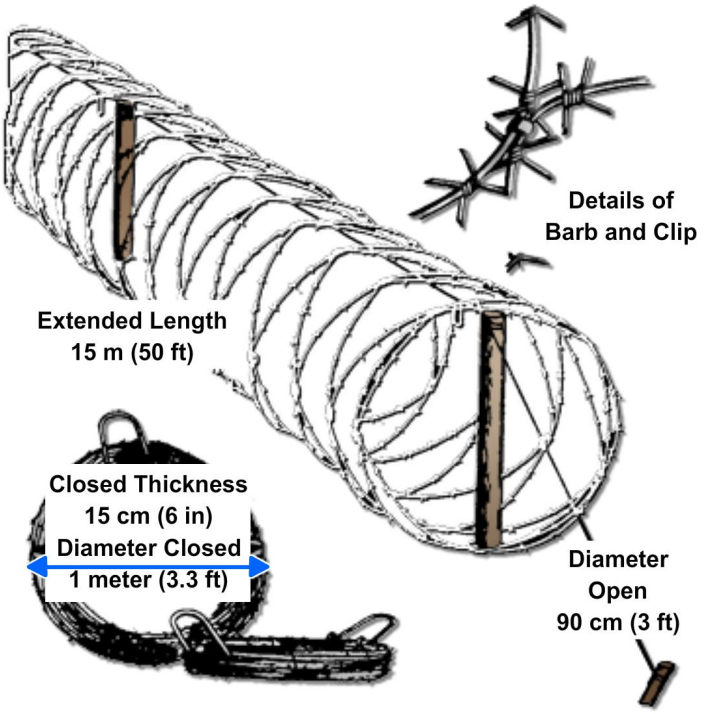


Figure 8-13 — Standard barbed wire concertina.

BARBED TAPE concertina comes in a diameter of 33 inches and an expanded length of 50 feet. It is formed of barbed tape wrapped around a high-strength, spring-steel, core wire. Its configuration, method of handling, and method of employment are similar to standard barbed wire concertina. One roll weighs 31.8 pounds.

2.1.0 Handling

The collapsed concertina is tied with plain wire bindings attached to the quarter points of a coil at one end of the concertina. When opening the concertina, remove these bindings and twist them around the carrying handle for use in retying the concertina when it is again collapsed. You need a group of four Seabees to open a concertina and to extend it to the 50-foot length. Place one Seabee at each end and the other two spaced along its length to ensure that it opens and extends evenly. When necessary, two Seabees can easily open a concertina by bouncing it on the ground to prevent snagging as they open it.

Concertina wire can be collapsed in the following manner:

1. Remove all the kinks in the coils.
2. Tighten or replace the loose clips with plain wire.
3. A person should be at each end of the concertina and with one foot at the bottom of the coil and one arm under the top of the coil to close it.

4. Now, the people at the ends of the concertina should walk toward each other closing the concertina as they go by feeding the wire over their arms and against their feet.
5. After closing, the concertina should be laid flat and compressed with their feet.
6. The concertina should be tied with plain wire bindings.

To carry the collapsed concertina, step into the center of the coil, and pick it up by the wire handles attached to the midpoints of the end coil.

Use improvised staples—approximately 18 inches long and made of ½ inch driftpins or similar material—to fasten the bottoms of concertina fences securely to the ground.

2.2.0 Organization of Work

Table 8-2 lists the materials and hours required to assemble various entanglements. The normal sizes of work crews are listed in the descriptions of the entanglements. For each construction project, the senior petty officer divides their crew into groups of approximately equal size, based on their knowledge of the skill and the speed they can accomplish the job. The teams should be organized in such a way that construction proceeds in proper order and at a uniform rate. Each individual must know exactly what their group is to do and what their job is in the group. Everyone handling the wire should have barbed wire gauntlets. The sequence of operations for each fence is given in the paragraph describing the erection of the fence. The sequence outlined should be followed, and as the handler gains experience, the size and composition of the work groups may vary. For each section of entanglement, all fence-building operations normally proceed from right to left, as one faces the enemy. However, it may be necessary to work from left to right. Everyone should be taught to work in either direction. In case of heavy casualties, the senior officer or petty officer decides what wires, if any, are to be omitted.

Table 8-2— Materials and Time to Construct Different Entanglements

Types of entanglements	Pickets				Barbed wire No. of 400m, 41.5 kg reels[1]	No. of concertinas[4]	Staples	Lb of materials per linear m of entanglement [2]	Hours to erect 300m of entanglement[5]
	extra long	long	medium	short					
Double apron, 4 and 2 pace		100		200	14-15 (19)[5]			10 (7.7)[6]	59
Double apron, 6 and 3 pace		66		132	13-14 (18)[5]			8 (5.7)[6]	49
High wire (less guy wires)		198			17-19 (24)[5]			11.6 (8.8)[6]	79
Low wire, 4 and 2 pace			100	200	11 (15)[5]			7.9 (6.1)[6]	49
4-strand fence		100		2	5-6 (7)[5]			4.8 (3.9)[6]	20
Double expedient concertina		101		4	3	100	295	15.1	40
Triple expedient concertina	51	101		7	4	148	295	22.8	99
Triple standard concertina		160		4	3 (4)[5]	59	317	17.3 (11.8)[6]	30

1. Lower number of reels applies when screw pickets are used: high number when U-shaped pickets are used. Add difference between the two to the higher number when wood pickets are used.

2. Average weight when any issue metal pickets are used.

3. Hours are based on the use of screw pickets. With the exception of the triple-standard concertinas, add 20 percent to the time when driven pickets are used. With experienced troops, reduce time by one-third. Increase time by 50 percent for night work.

4. Based on concertinas being made up in rear areas and ready for issue. Once expedient concertina opens to 19.7 ft length, as compared with 15 meters for a standard concertina; it requires 302 feet of standard barbed wire, also small quantities of No. 16 smooth wire for ties.

5. Number of 984 ft 14.5 kg barbed tape carrying cases required if barbed tape is used in place of barbed wire.

6. Kgs of materials required per linear meter of entanglement if barbed tape is used in place of barbed wire and barbed tape concertina is used in place of standard and barbed wire concertina.

For night construction, make the following additional preparations:

1. Lay tracing tape from the materials dump to the site of work and then along the line of fence, where possible.
2. Tie materials together in man-loads and pickets, bundled tightly to prevent rattling.
3. Remove and replace wire fastenings of wire coils and pickets with string that can be broken easily.
4. Tie a piece of tape to the ends of the wire on each reel or bobbin.

Proper supervision of entanglement construction includes the following:

1. Organize the work into tasks.
2. Ensure the tasks are carried out in proper sequence.
3. Prevent bunching and overcrowding of personnel.
4. Ensure the wires are tightened properly and spaced correctly.
5. Check ties to see they are being made correctly and at the right points.

When the enemy is in close proximity, the necessary precautions include the following:

1. Provide security around the work party.
2. Maintain silence.
3. Ensure no working on the enemy side of the fence unless absolutely necessary.
4. Use screw pickets, when available.
5. Allow Seabees that are not working to rest until they are required.
6. Keep individual weapons nearby at all times.

2.3.0 Ties for Assembling Entanglements

Wires are tied to pickets from the friendly side of the wire and picket, stretching the wire with the right hand as the tie is started. The four ties used in erecting wire entanglements are shown in *Figure 8-14*.

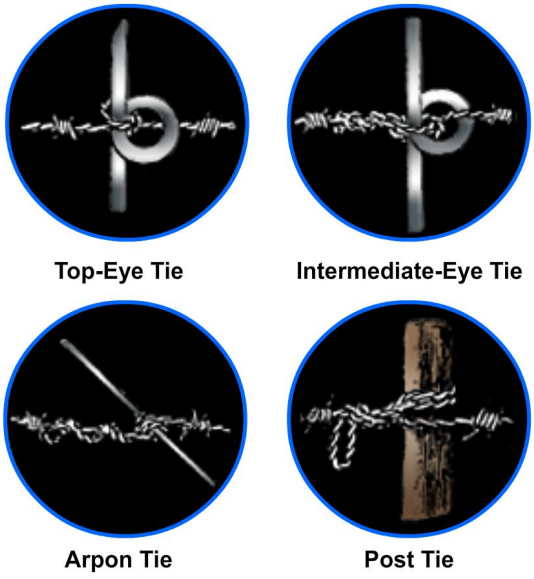
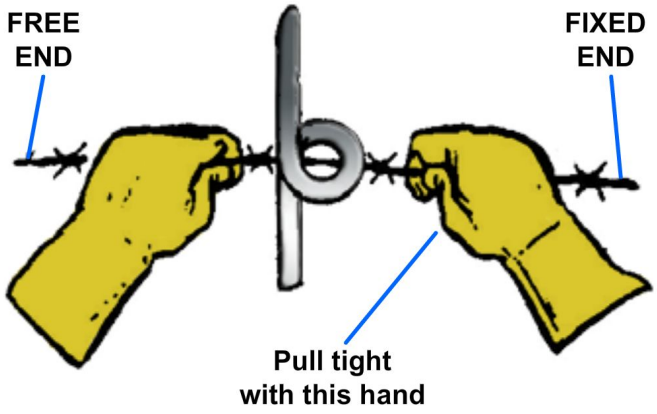


Figure 8-14 — Ties for connecting entanglements.

2.3.1 Top Eye Tie

Use the top eye tie to fasten standard barbed wire to the top eye of the screw pickets. Make the top eye tie with one continuous movement of the left hand (*Figure 8-15*), while the right hand exerts a pull on the fixed end of the wire. This is a secure tie; it is quickly made; and it uses only a short piece of wire.



1 Bring wire up into eye

Figure 8-15 — Placing a top end tie.

2.3.2 Intermediate Eye Tie

Use the intermediate eye tie to fasten standard barbed wire to eyes other than the top eye in screw pickets. See the example shown in *Figure 8-15*. This tie and the other ties described below require more time to make than the top eye tie, and each uses several inches of wire. In making the intermediate eye tie shown in *Figure 8-15*, the following points are especially important:

1. The right hand reaches over the fixed wire and around the picket with the palm down. The left hand holds the fixed end for tension.
2. The loops are removed from the free end and wrapped around the picket.
3. One side of the loop should pass above the eye and the other side below the eye.



1 With palm down reach around picket over FIXED END and take loop from FREE END

A = FREE END B = FIXED END

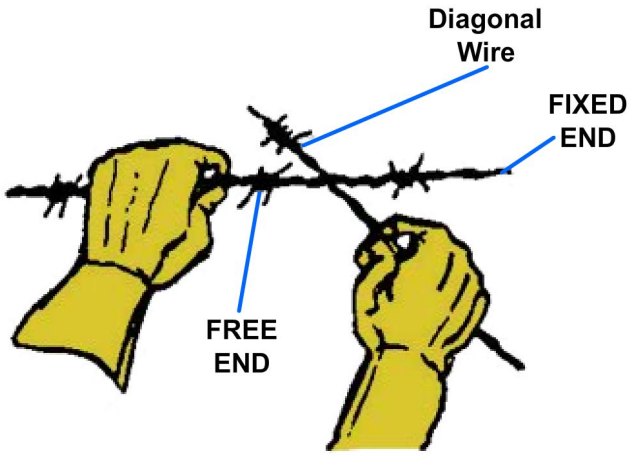
Figure 8-16 — An intermediate eye tie.

Interaction Available

Interaction Available

2.3.3 Apron Tie

Use the apron tie (*Figure 8-17*), whenever two wires that cross must be tied together. Tie it in the same manner as the post tie except that a wire is substituted for the post.



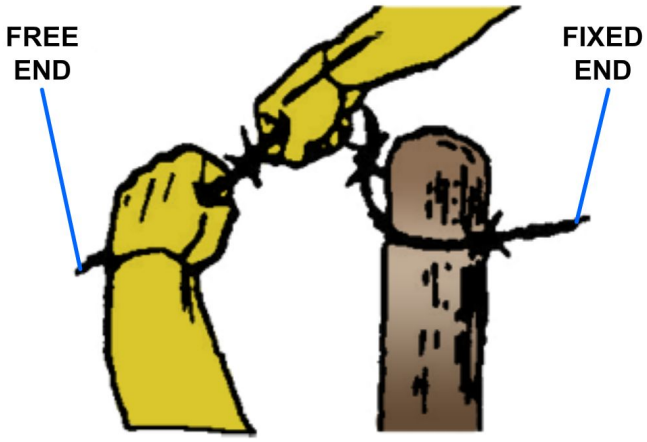
1

Figure 8-17 — Standard barbed wire apron tie.

Interaction Available

2.3.4 Post Tie

Fasten standard barbed wire to wooden pickets or to the steel U-shaped picket with the post tie shown in *Figure 8-18*. Wrap the wire tightly around the post to keep the barbs from sliding down. With the U-shaped picket, engage the wire wrapping in a notch in the picket. This method is essentially the same as that of the intermediate eye tie.



1 With palm down reach around picket or post over FIXED END and take loop from FREE END

Figure 8-18 — Post tie.

Interaction Available

2.3.5 Barbed-Tape Splices

Connecting slots at each end of a 164-foot reel provide a quick method of splicing reels of barbed tape. You can also splice barbed tape by interlocking the twisted barbs of two separate lengths, then completing the splice by twisting a short piece of wire to each end of the area where spliced.

2.4.0 Installing Wires

One of the designs utilized when installing wires is to install them in a straight line. You may attach four or more wires up the picket to make the fence. When installing wires in this fashion, follow these steps:

1. Attach the end of the wire to the first anchor picket. This is the picket at the right end of a section of entanglement from the friendly side. You will build fences from the right to the left as this makes it easier for someone who is right-handed to make the ties while facing toward the enemy.
2. Insert a bar in the reel and carry the reel 75 to 88 feet, allowing the wire to unreel from the bottom. Do this on the friendly side of the row of pickets to which the wire is to be tied.
3. Put slack in the wire by moving back toward the starting point; then by working with another Seabee, alternate adding the ties. It is easier and faster to have two Seabees available to make the ties as the reel is unwound.

After a wire is installed, tighten it, if necessary, by racking with a driftpin or short stick. Place the driftpin over the wire at a 45-degree angle to the wire (*Figure 8-19, frame 1*). Then place one end under the wire by pushing it down and loop it under the wire (*Figure 8-19, frames 2 and 3*). This should make the wire wrap around the driftpin (*Figure 8-19, frame 4*). At this time take the driftpin and twist it taking up the slack in the wire (*Figure 8-19, frame 5*). Do not rack the wires at ties or where they intersect other wires because this makes salvage of the wire very difficult. Fences are similarly racked to tighten them when they sag after having been installed for some time. Wires should be just taut enough to prevent them from being depressed easily by boards, mats, or similar objects thrown across them. When the wires are stretched too tightly, they are more easily cut by fragments. **NEVER** tighten barbed steel tape by racking.

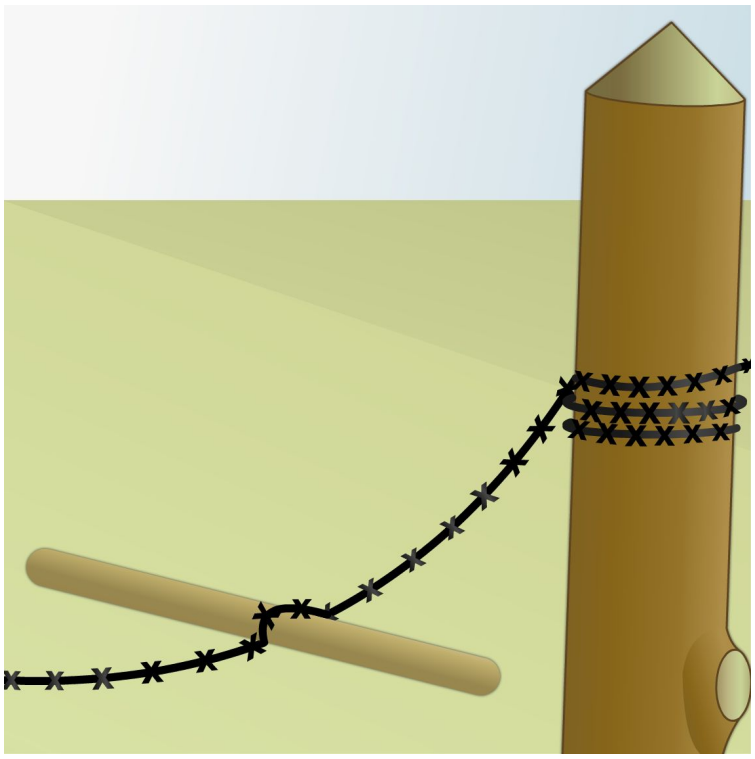


Figure 8-19 — Tightening wire by racking.

Interaction Available

2.5.0 Four-Strand Cattle Fence

The four-strand center section of a double apron fence can be installed rapidly to obtain some obstacle effect. The aprons can be added later to develop it into a double apron fence. In countries where wire fences are used by farmers, obstacles in the form of four-strand cattle fences (*Figure 8-20*) will blend with the landscape. Their design should follow the local custom as closely as possible, usually wooden pickets at about 2- to 4-pace intervals with four horizontal strands of barbed wire fixed to them. Site them along footpaths and edges of fields or crops where they do not look out of place. When conditions permit, you may improve this fence by installing guy wires in the same manner as the diagonal wires of the double apron fence. All longitudinal wires of this fence must start and end at an anchor picket.

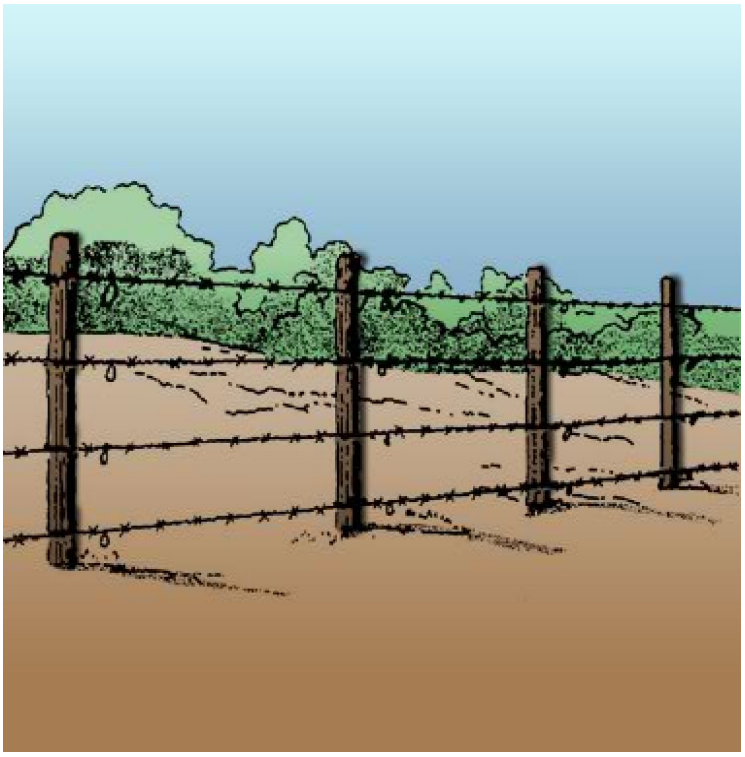


Figure 8-20 — Four-strand cattle fence as viewed from the enemy side.

2.5.1 Phase One

Short sections of this fence require eight Seabees or as many as sixteen for the 984-foot sections. There is a two-step process to place this fence—laying out and installing pickets, and then installing wires.

After the working party is divided into two groups of approximate equal size, the first group carries and lays out long pickets at 9.8-foot intervals along the center line of the fence. They begin and end the section with an anchor picket and include anchor pickets for guys, if needed. The second group installs the pickets.

2.5.2 Phase Two

As the first task is completed, manpower is individually moved to the head of the fence and organized into teams of two or four to install the wires. Teams of four will utilize two Seabees to carry the reel and two to make ties and pull the wire tight. Teams of two require the wire to be unrolled first for 164 to 328 feet. Then they will return to the beginning and make the ties. Sometimes the wire is made into bobbins and it is carried and unwound by one individual while the other makes the ties. The first team installs the bottom fence wire and draws it tight and close to the ground. Succeeding teams install the next wires in order.

2.6.0 Double Apron Fence

There are two types of double apron fence: the 4 and 2 pace fence and the 6 and 3 pace fence. The 4 and 2 pace fence (*Figure 8-21*) is the better obstacle of the two and

is the type more commonly used. In this fence, the center pickets are 4 paces apart and the anchor pickets are 2 paces from the line of the center pickets and opposite the midpoint of the space between the center pickets. The 6 and 3 pace fence follows the same pattern with pickets at 6 and 3 pace intervals. For this fence, less material and construction time are required, but the obstacle effect is substantially reduced, because with the longer wire spans, it is easier to raise the lower wires and crawl over or under them. Except for picket spacing, the 4 and 2 pace and the 6 and 3 pace fences are identical. For this discussion, only the 4 and 2 pace fence is discussed in detail.

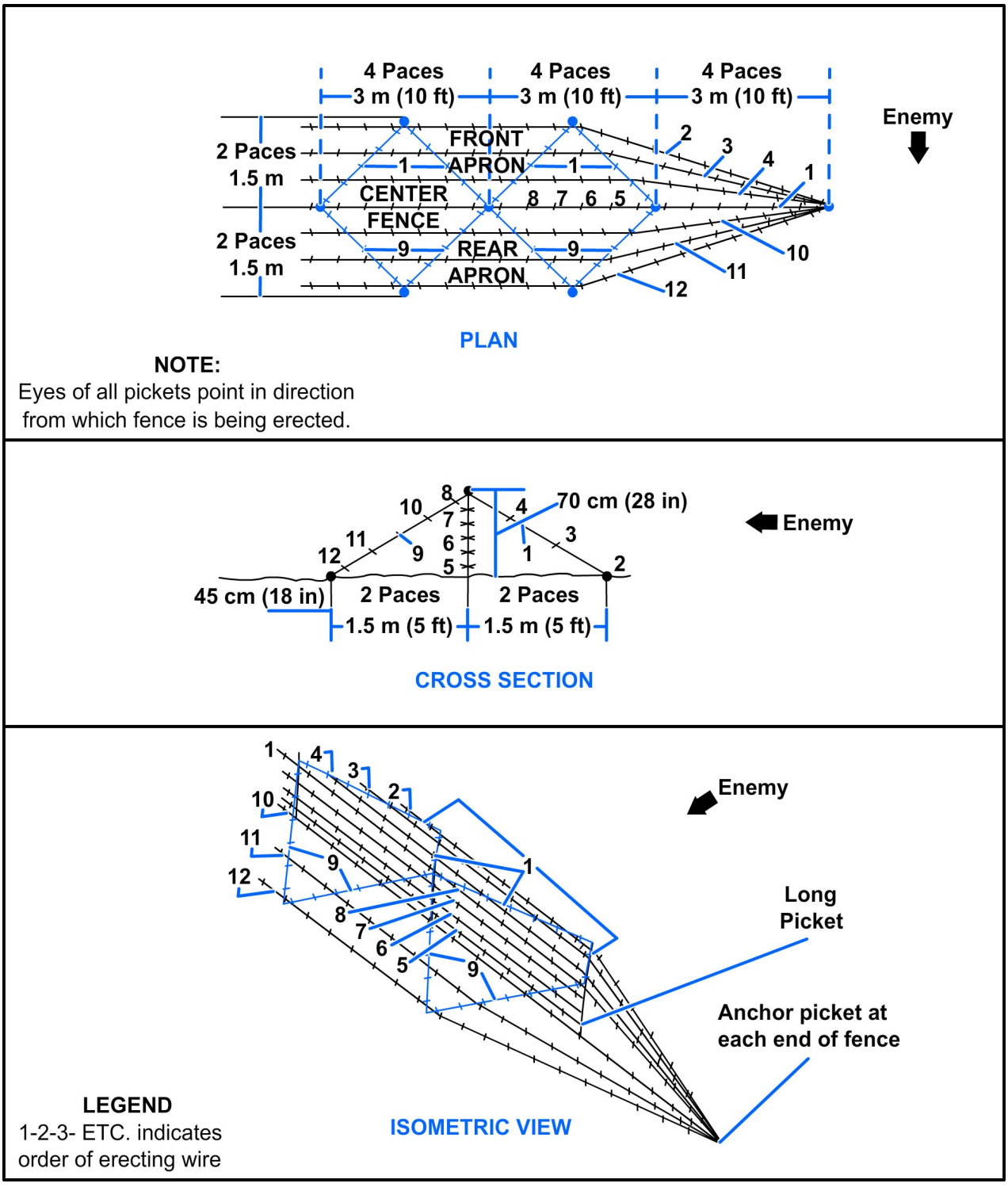


Figure 8-21 — Double apron fence.

A 984-foot section of either type of double apron fence is a platoon task normally requiring 1 ½ hours, with a team of 36 Seabees per platoon. There is a two-step operation when building a double apron fence, (1) laying out and installing pickets and (2) installing wire. The first operation is nearly completed before starting the second. The second operation is started as manpower becomes available and the first operation has moved far enough ahead to avoid congestion. A platoon is normally assigned to build a 984-foot section.

2.6.1 Phase One

After the working party is divided into three squads of three, one squad lays out the long pickets along the centerline of the fence at 4-pace intervals with their points toward the enemy. Another squad lays out the anchor pickets with points toward the enemy and positioned 2 paces each way from the centerline and midway between the long pickets (*Figure 8-22*). The spacing is readily checked with a long picket. The third squad installs all the pickets with the help of the two other squads, as the latter finishes the work of laying out the pickets. When installed, the lower notch or bottom eye of the long pickets should be approximately 4 inches off the ground to make passage difficult either over or under the bottom wires.

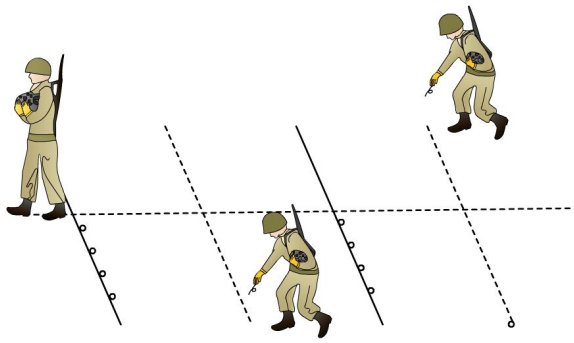


Figure 8-22 — Laying out anchor points.

2.6.2 Phase Two

As the groups complete the first operation, they return to the head of the fence and begin installing wire. The order in which the wires are installed is shown in *Figure 8-20* and is further illustrated in *Figure 8-23*. Care should be taken to avoid having anyone cut off between the fence and the enemy. The teams should be divided into groups of two or four to install the wires in numerical order; that is, as soon as the first group installs wire one, have moved away from the beginning of the fence, and are out of the way, the next wire should be started. Installation is as follows:

1. The No. 1 wire is the diagonal wire on the enemy side and is secured with a top eye tie to all pickets. It is important to keep this wire tight.
2. The No. 2 wire is the trip wire on the enemy side of the fence and is secured to both diagonals just above the anchor picket with the apron tie. This wire must be tight enough and close enough to the ground to make passage over or under the wire difficult.
3. The No. 3 wire is an apron wire on the enemy side of the fence. It is secured to the first diagonal wire, and thereafter to each alternate diagonal, and then to the last diagonal wire. The No. 4 wire is also an apron wire on the enemy side of the fence. It is secured to the first diagonal wire (No. 1), thereafter to the diagonal wires which are not tied to the No. 3 wire, and then to the last diagonal wire. Apron wire Nos. 3 and 4 are equally spaced along the diagonal wire.

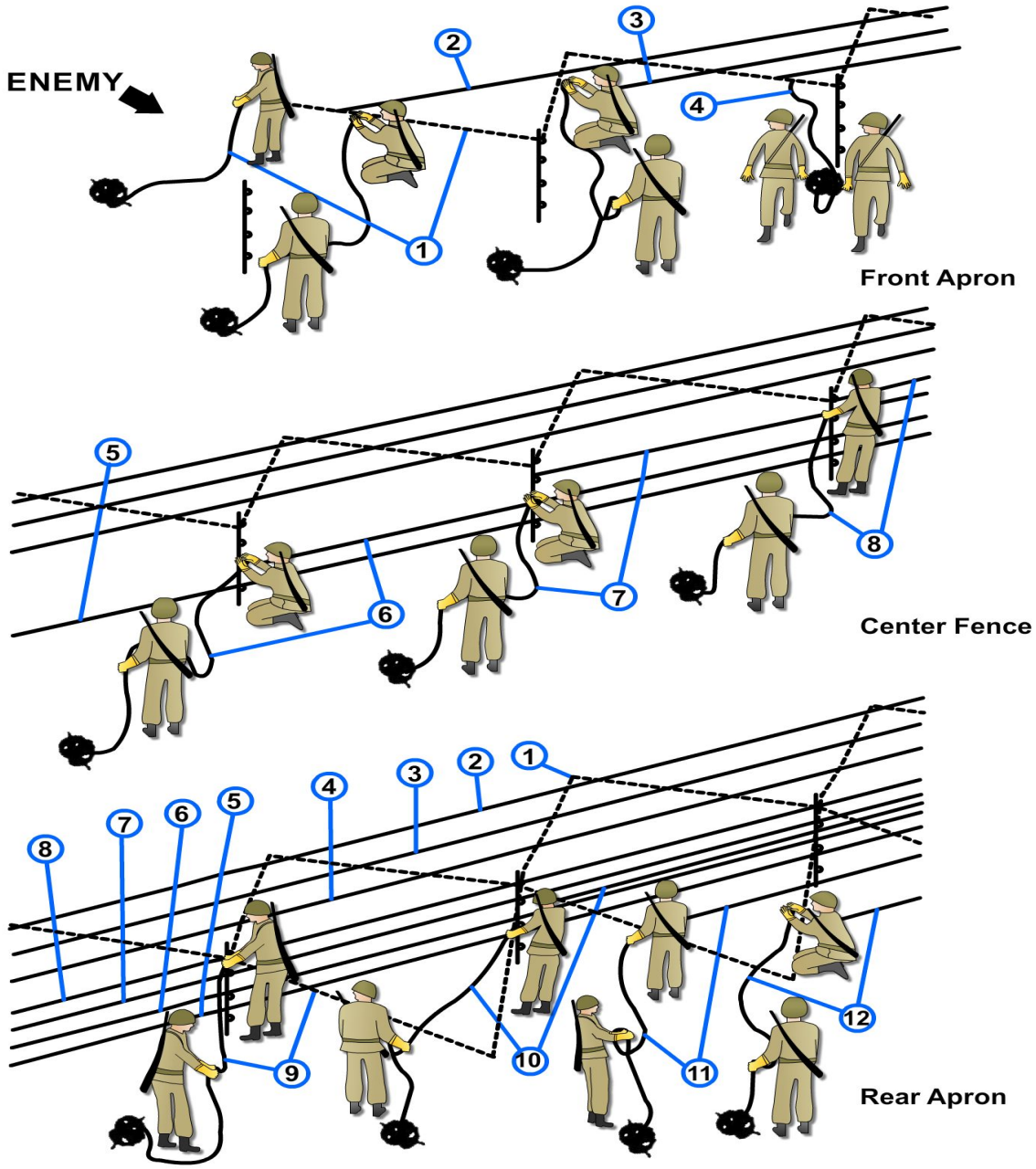


Figure 8-23 – Sequence for placing a double apron fence.

4. The No. 5 wire is the first one that is not started from the end anchor picket. It is started at the first long picket and ended at the last long picket. It is secured with the intermediate eye tie and is stretched tightly to prevent passage over or under it.
5. Wire Nos. 6, 7, and 8 complete the center portion of the fence and are secured to the long picket Nos. 6 and 7 with the intermediate eye tie. They also start at the first and end at the last long picket. No. 8 is secured with the top eye tie. These wires (Nos. 6, 7, and 8) form the backbone of the fence and are drawn up tightly to hold the pickets in position.
6. Wire No. 9 is the diagonal apron wire on the friendly side of the fence and is secured with the top eye tie to all pickets. Wire Nos. 10 and 11 are apron wires, and wire No. 12 is the trip wire on the friendly side of the fence. Wire No. 12 is installed in the same manner as wire No. 2.

If the fence is not satisfactorily tight when installed, wires are tightened by racking as described earlier in this chapter.

2.7.0 Standard Concertina Fence

As an obstacle, in most situations, the triple standard concertina fence is better than the double apron fence. The material for it weighs about 50 percent more, but it is erected with about one half of the man-hours. Every concertina fence is secured firmly to the ground by driving staples at intervals of not more than 6.6 feet. The staples are used on the single concertina fence and on the front concertina of the double and triple types. The two types of fence are as follows:

1. SINGLE CONCERTINA. This is one line of concertinas. It is erected quickly and easily but is not an effective obstacle in itself. It is used as an emergency entanglement or for the temporary closing of gaps between other obstacles. It is for such purposes that one roll of concertina may be habitually carried on the front of each vehicle in combat units.
2. DOUBLE CONCERTINA. This consists of a double line of concertinas with no space between lines. The two lines are installed with staggered joints. As an obstacle, the double concertina is less effective than a well placed double apron fence. It is used in some situations to supplement other obstacles in a band or zone.

2.8.0 Triple Standard Concertina Fence

This fence consists of two lines of concertinas serving as a base, with a third line resting on top, as shown in *Figure 8-24*. All lines are installed with staggered joints. Each line is

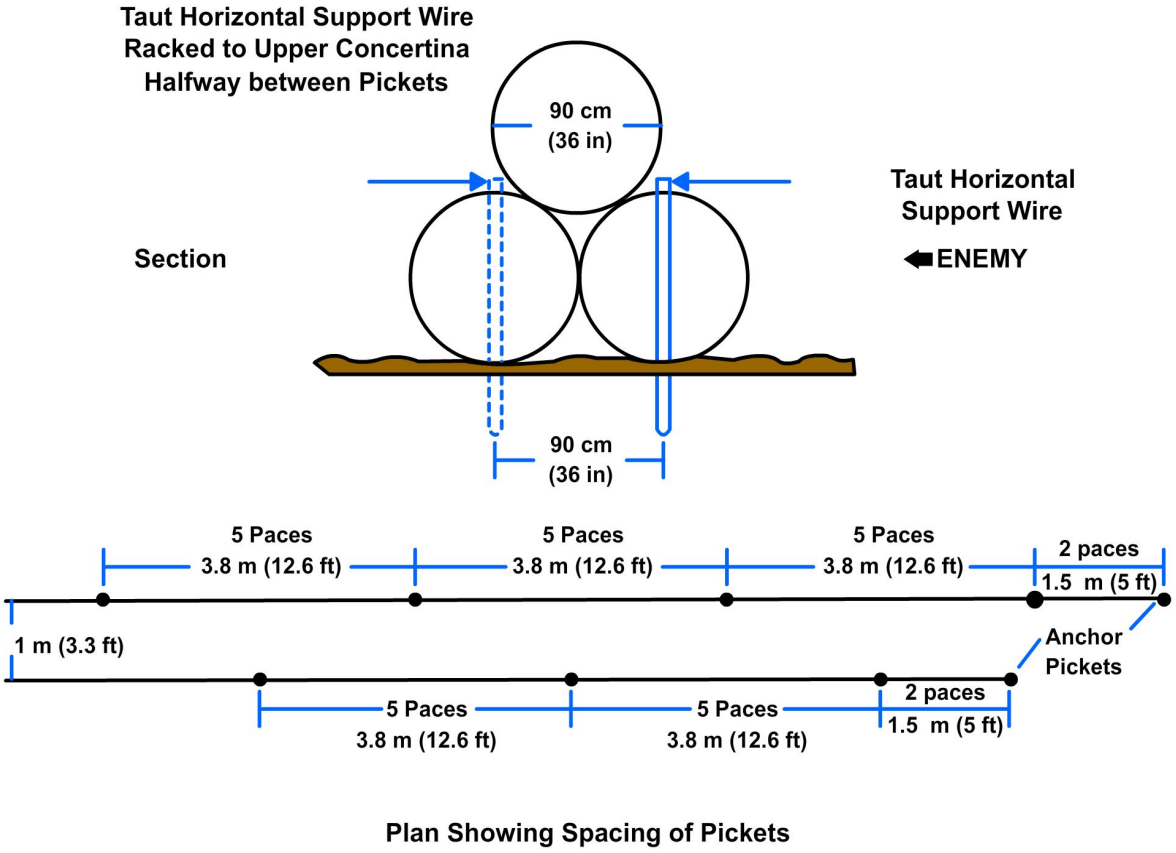


Figure 8-24 — Triple standard concertina fence.

completed before the next is started, so a partially completed concertina entanglement presents some obstruction. It is erected quickly and is difficult to cross, cut, or crawl through.

A 984-foot section of this fence is a platoon task normally requiring less than 1 hour to construct. There are two operations in building this fence, (1) carrying and laying out pickets and concertina rolls and installing concertina fence and (2) opening and installing concertinas.

2.8.1 Phase One

For the first operation, the working party is divided into three groups of an approximate equal number of people—one group to lay out all concertina fence, one group to install all concertina fence, and finally one to lay out all concertina rolls.

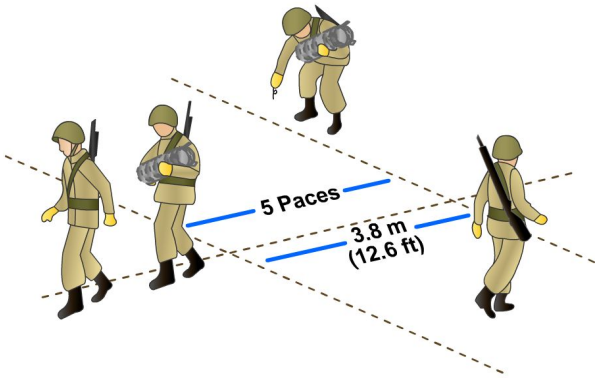


Figure 8-25 — Laying out long pickets for a triple concertina fence.

The first group lays out front-row long pickets of concertina fence (*Figure 8-25*) at 5-pace intervals on the line of the fence with the points of the pickets on the centerline and pointing toward the enemy. The rear-row long pickets are then laid out on a centerline 3 feet to the rear and opposite the center of interval between the front-row long pickets. An anchor picket is laid out at each end of each line, 5 feet from the end long picket.

The second group installs pickets beginning with the front row (*Figure 8-26*). As in other fences, eyes of screw pickets are to the right. Concave faces of U-shaped pickets are toward the enemy.

The third group lays out concertinas along the rows of pickets (*Figure 8-27*). In the front row, one roll is placed at the third picket and one at every fourth picket thereafter. Sixteen staples accompany each front-row concertina. In the second row, two rolls are

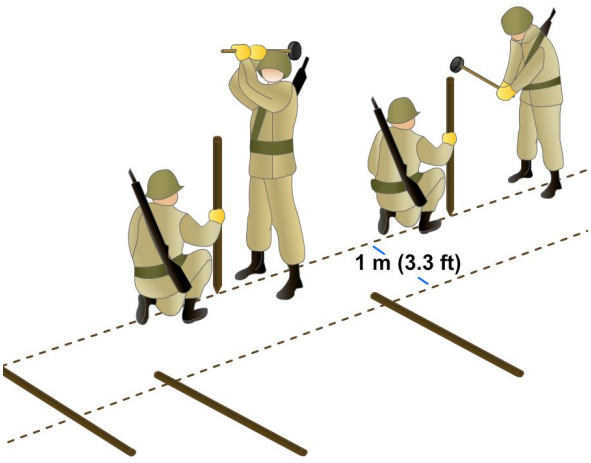


Figure 8-26 — Installing front-row pickets for the triple concertina fence.

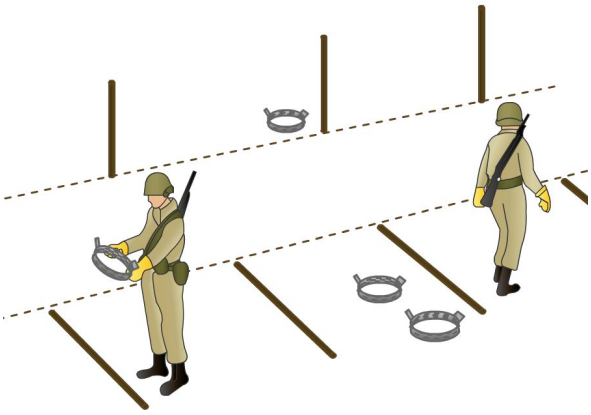


Figure 8-27 — Laying out concertina.

placed at the third picket and two at every fourth picket thereafter. As each roll is placed in position, its binding wires are unfastened but are left attached to the hoop at one end of the roll.

2.8.2 Phase Two

As the groups complete the first operation, the Seabees need to be reorganized into groups of four to open and install concertinas, beginning at the head of the fence. The general sequence is shown in *Figure 8-28* and is described as follows:

1. Open the front-row concertinas in front of the double line of pickets and the other two concertinas in the rear.
2. Lift each front-row concertina, in turn, and drop it over the long pickets; then join the concertina ends as shown in *Figure 8-29*.
3. Fasten the bottom of the concertina to the ground by driving a staple over each pair of end hoops: one over the bottom of the coil at each long picket and one at the ½ and ¼ points of the 12.5-foot picket spacing. Securing the front concertina to the ground is essential and must be done before installing concertina in the rear unless there will be a need to access the enemy side of the entanglement later.
4. Stretch a barbed wire strand along the top of each front row and fasten it to the tops of the long pickets, using the top eye tie for screw pickets. Stretch these wires as tightly as possible to improve the resistance of the fence against crushing.
5. Install the rear-row concertina as described above for the front-row concertina.
6. Install the concertina in the top row (*Figure 8-28*), fastening the end hoops of 50-foot sections with plain steel wire ties. Begin this row at a point between the ends of the front and rear of the lower rows, thus breaking all end joints.
7. Rack the top concertina to the rear horizontal wire at points halfway between the long pickets. If there is safe access to the enemy side of the fence, similarly rack the top concertina to the forward horizontal wire.

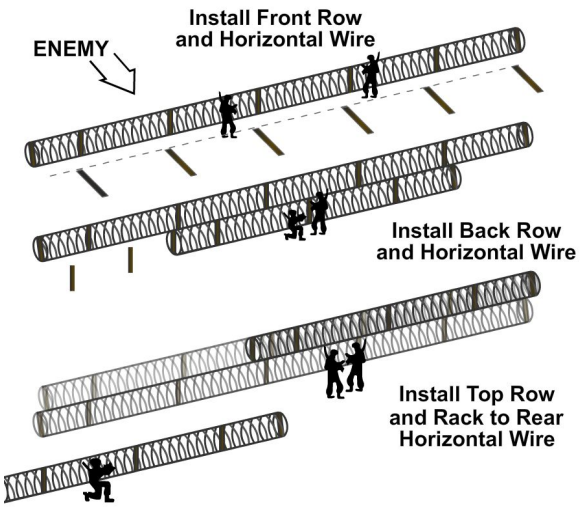


Figure 8-28 — Installing concertina.

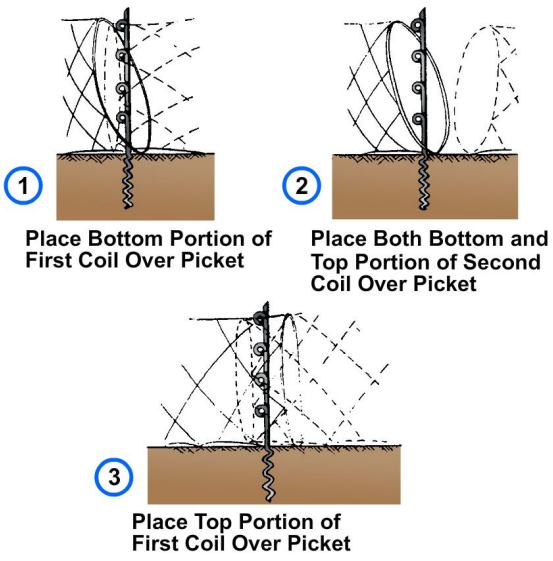


Figure 8-29 — Joining concertina.

2.9.0 Low Wire Entanglement

Figure 8-30 is an example of a 4 and 2 pace double apron fence in which medium pickets replace long pickets in the fence centerline. This results in omission of wire Nos. 6, 7, and 8, and brings all the apron and diagonal wires much closer to the ground, so passage underneath this fence is difficult. This fence may be used advantageously on one or both sides of the double apron fence. The low wire entanglement is used where concealment is essential. In tall grass or shallow water, this entanglement is almost invisible and is particularly effective as a surprise obstacle. However, the enemy can pick their way through this low-wire fence without much difficulty; therefore, for best results, it must be used in depth.

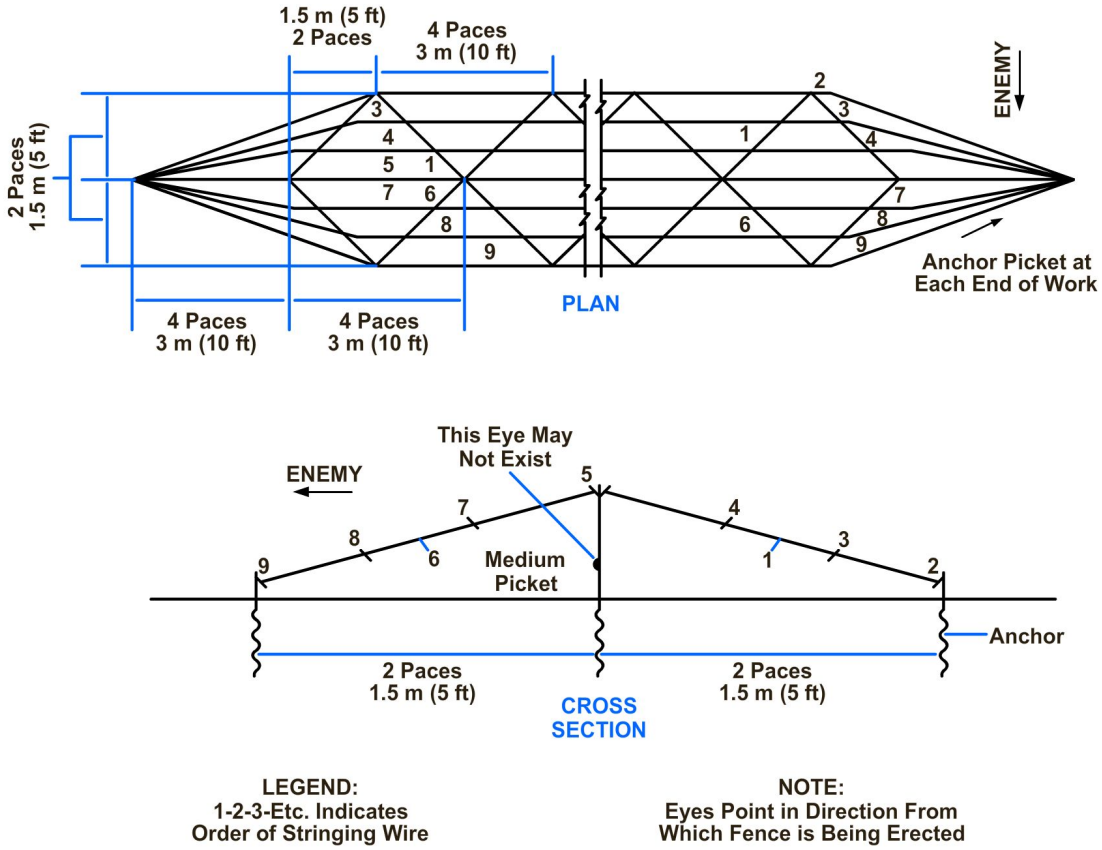


Figure 8-30 — Low-wire fence.

Except for the omission of three wires and the substitution of medium pickets, this fence is constructed in the same manner as the double apron fence.

2.10.0 High Wire Entanglement

This obstacle consists of two parallel 4-strand fences with a third 4-strand fence zigzagged between them to form triangular cells. With two rows of pickets, as shown in *Figure 8-31*, the entanglement is classified as a belt; with one or more additional rows of fences and triangular cells, it is a band. To add to the obstacle effect, front and rear aprons are installed and spirals of loose wire placed in the triangular cells.

A 984-foot section of high wire entanglement with two rows of pickets is a platoon task normally requiring about 2 hours, with a team of 38 Seabees per platoon. The two operations involve laying out and installing pickets, and then installing wire.

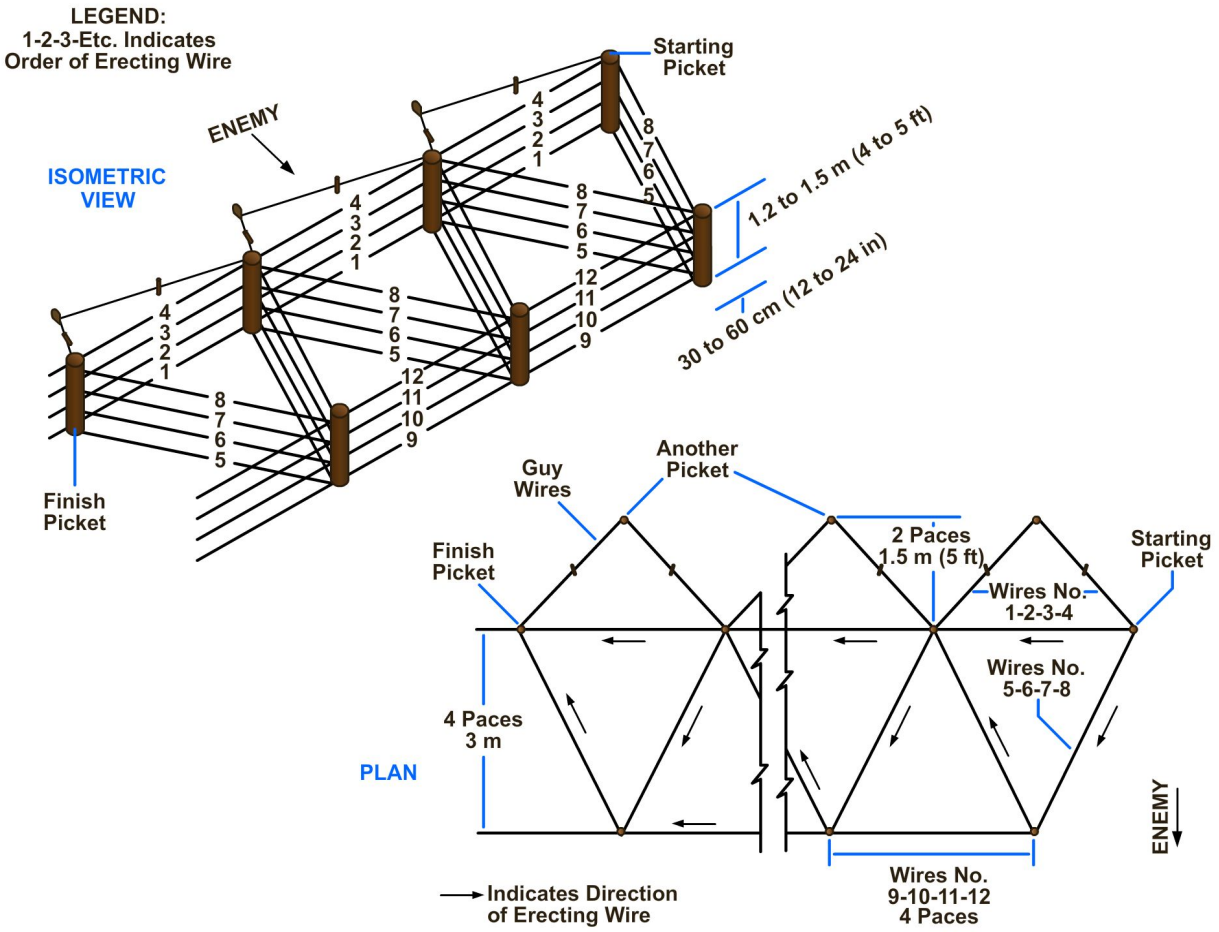


Figure 8-31 — High wire fence.

2.10.1 Phase One

For this operation, the working party should be divided into two groups with two-thirds of the manpower reporting to the first group and one-third to the second group. The first group carries and lays out pickets, front row first and at 10-foot intervals. Second row pickets are laid out in a line 10 feet to the rear of the front row and spaced midway between them. The first group also lays out an anchor picket in line with each end of each 4-strand fence, 10 feet from the nearest long picket. If guy lines are needed, anchor pickets are also laid out in lines 2 paces from the lines of the front and rear fences, opposite and midpoint of spaces between the long pickets. The second group installs front-row pickets, returns to the head of the fence, installs the rear row, and then

installs the anchor pickets. When the first group finishes laying out pickets, they begin installing wire and help finish installing the pickets.

2.10.2 Phase Two

As the first task is completed, the first group will be divided and moved individually to the head of the fence where they will be organized into teams of two or four to install wires in the same manner as for the 4-strand fence. The order of installation is as shown in *Figure 8-31*, except if front guy lines are used, they are installed before the No. 1 wire; rear guys after the No. 12 wire. The horizontal wires of each 4-strand fence begin and end at an anchor picket.

2.11.0 Trestle Apron Fence

The trestle apron fence (*Figure 8-32*) has inclined crosspieces spaced at 15.7- to 19.7-foot intervals to carry longitudinal wires on the enemy side. The rear ends of the crosspieces are carried on triangular timber frames that are kept from spreading by tension wires on the friendly side. The crosspiece may be laid flat on the ground for tying the longitudinal wires in place and then raised into position on the triangular frames. The frames are tied securely in place and held by the tension wires. The fence should be sited in such a way that it can be guyed longitudinally to natural anchorages and racked tight.

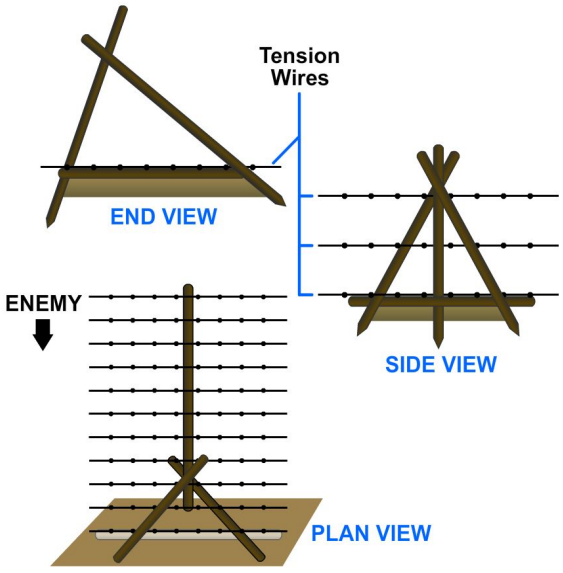


Figure 8-32 — Trestle apron fence.

2.12.0 Lapland Fence

Figure 8-33 shows the lapland fence that can be used equally well on frozen or rocky ground and on bogs or marshland. This fence is wired with six strands of barbed wire on

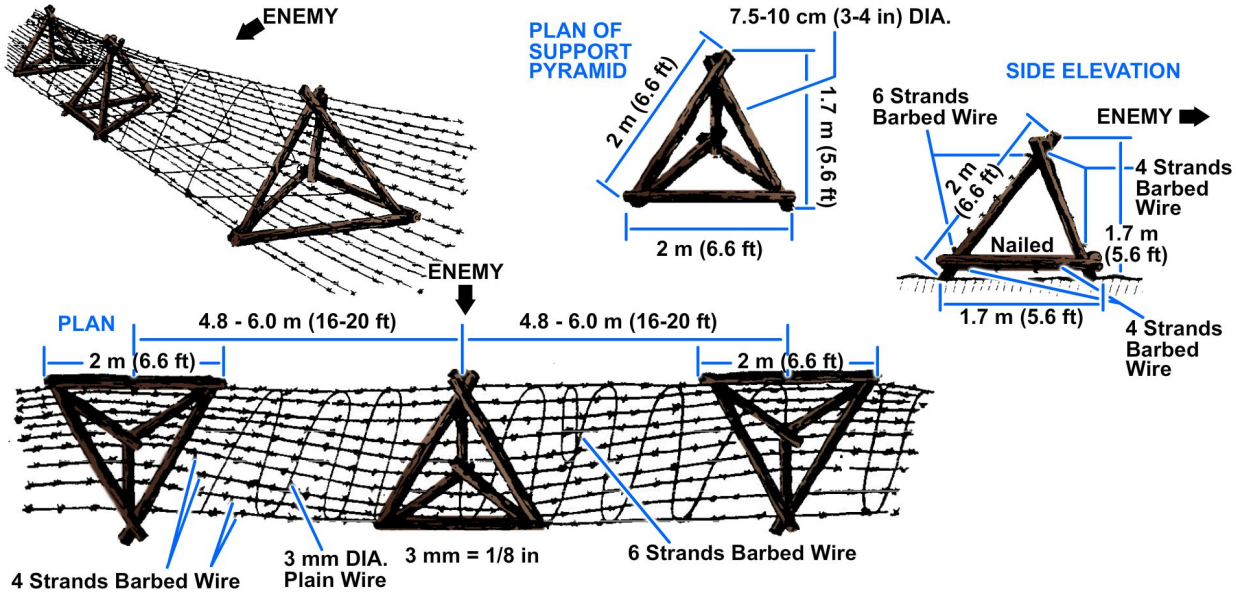


Figure 8-33 — Lapland fence.

the enemy side, four strands on the friendly side, and four strands on the base. In snow, the tripods can be lifted out of the snow with poles or other means to reset the obstacle on top of newly fallen snow. On soft ground, the base setting of tripods and the base wires give enough bearing surface to prevent the obstacle from sinking.

2.13.0 Portable Barbed Wire Obstacles

Standard concertinas are readily moved and are well adapted for the temporary closing of gaps or lanes, or for adding rapidly to the obstacle effect of fixed barriers, such as the double apron fence. Other portable, barbed wire obstacles are described below.

2.13.1 Spirals of Loose Wire

By filling open spaces in and between wire entanglements with spirals of loose wire, the obstacle effect is substantially increased. The enemy is tripped, entangled, and temporarily immobilized. Spirals for such use are prepared as follows:

1. Drive four 3.3-foot posts in the ground to form a diamond 3.3 by 1.6 feet.
2. Wind 246 feet of barbed wire tightly around the frame. Start winding at the bottom and wind helically toward the top.
3. Remove the wire from the frame and tie it at quarter points for carrying or hauling to the site where it is to be opened and used. One spiral weighs less than 20 pounds and one person can carry three or more of them by stepping inside the coils, and using wire handles of the type furnished with the standard concertina.
4. If spirals are needed in large quantities, mount the diamond-shaped frame on the winch of a truck and use the winch to coil the wire.

2.13.2 Knife Rest

The knife rest (*Figure 8-34*) is a portable, wooden or metal frame strung with barbed wire. It should be used wherever a readily removable barrier is needed; for example, at lanes in wire obstacles or at roadblocks. With a metal frame, it can be used as an effective underwater obstacle in beach defense. Knife rests are normally constructed with 9.8 to 16.4 feet between cross members. They should be approximately 3.3 feet high. The cross members must be firmly lashed to the horizontal member with plain wire. When placed in position, knife rests must be fixed securely.

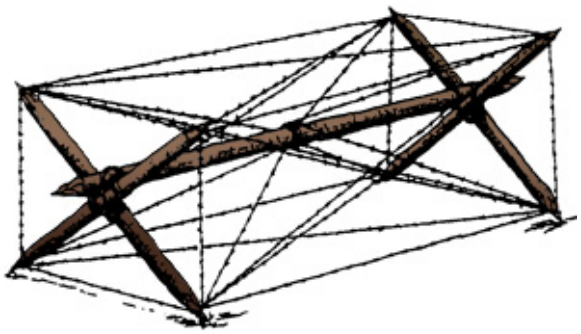


Figure 8-34 — Knife rest.

2.13.3 Trip Wires

Immediately after a defensive position is occupied and before an attempt is made to erect protective wire, trip wires should be placed just outside of grenade range, usually 98 to 131 feet. These wires should stretch about 9 inches above the ground and be fastened to pickets at not more than 16.4-foot intervals. They can be concealed in long grass or crops on a natural line, such as the side of a path or the edge of a field. The trip wires should be placed in depth in an irregular pattern.

2.13.4 Tanglefoot

Tanglefoot (*Figure 8-35*) should be used where concealment is essential and to prevent the enemy from crawling between fences and in front of emplacements. The obstacle should be used in a minimum depth of 32.8 feet. The pickets should be spaced at irregular intervals of 2.5 to 10 feet. The height of the barbed wire should vary between 9 and 30 inches. Tanglefoot should be sited in scrub, if possible, using bushes as supports for part of the wire. In open ground, short pickets should be used. To help prevent the enemy from secretly cutting lanes in, or tunneling under, the entanglement, the growth of grass should be controlled.

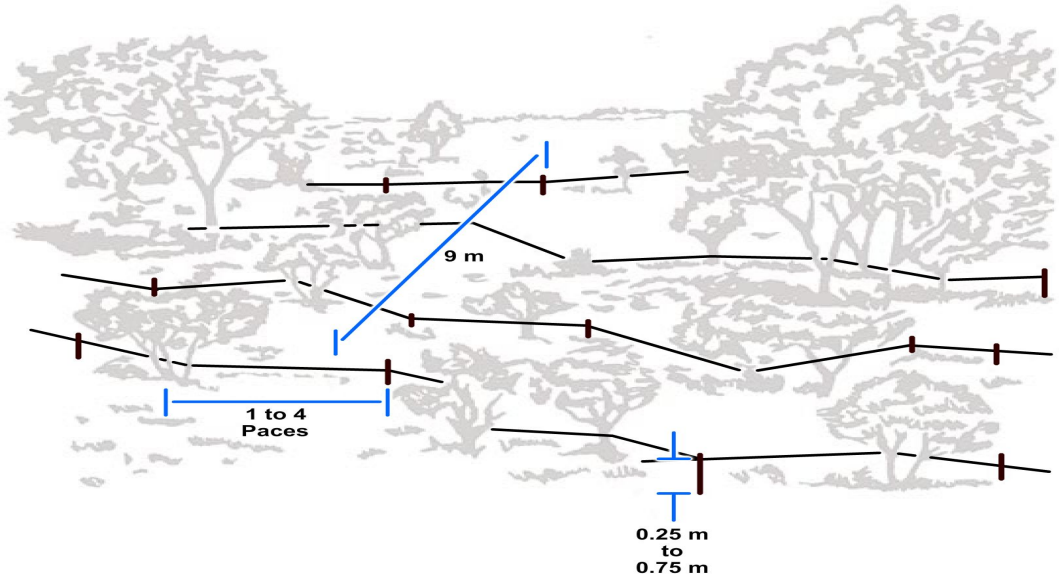


Figure 8-35 — Tanglefoot in barrier system.

2.14.0 Combination Bands

The high wire entanglement may be built with additional rows of fences and triangular cells to form bands of any desired depth, or it may be made more effective by adding front and rear aprons. Other types of fences may be combined in bands to form obstacles that are more difficult to breach than a single belt. Portable, barbed wire obstacles may be added as described previously. The construction of bands of various types is desirable because this makes it difficult for the enemy to develop standard methods of passage. It also allows for fitting the obstacles to the situation with the time and materials available. Six different types of effective combination bands are shown in *Figure 8-36*. Other variations can be developed readily.

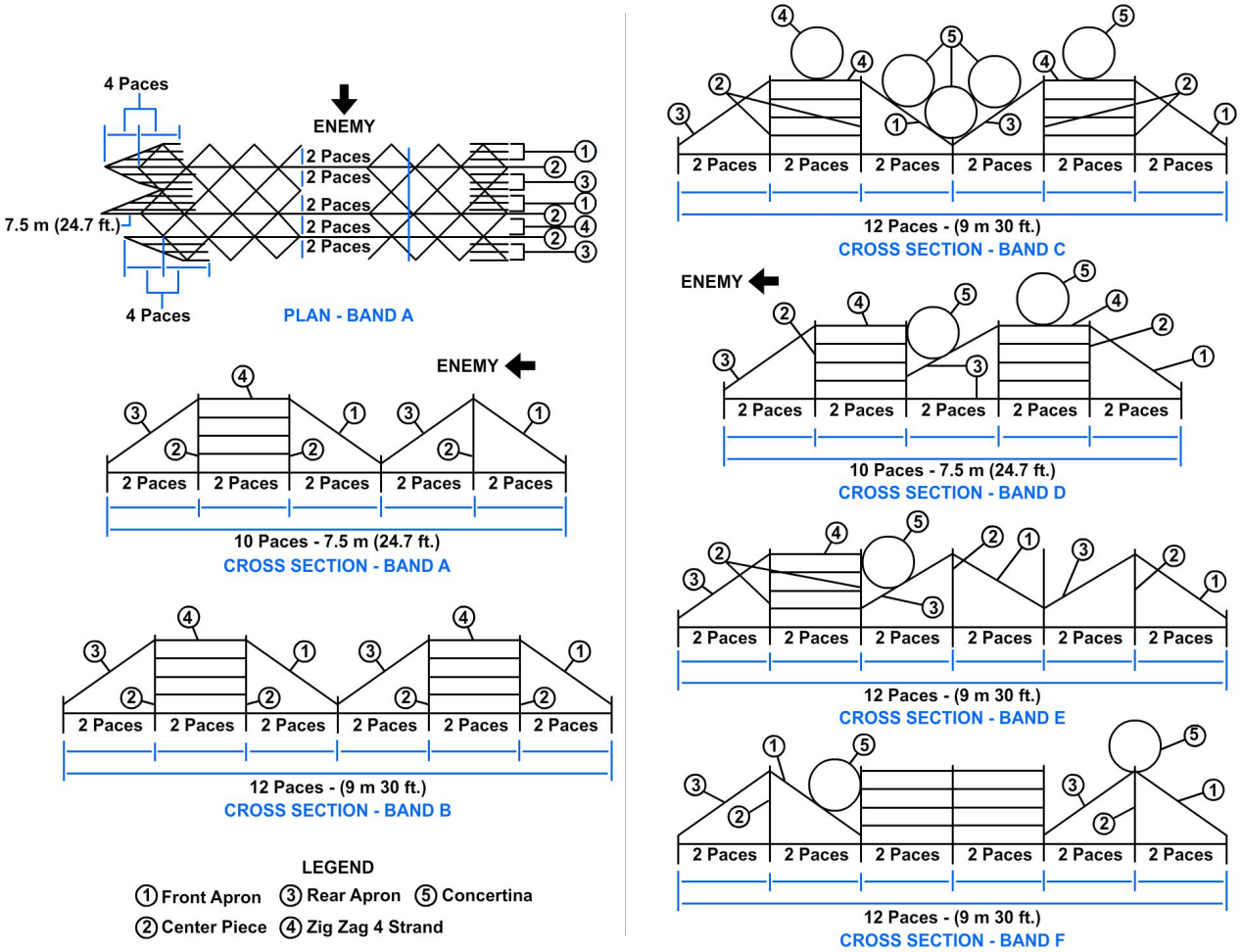


Figure 8-36 — Combination bands of wire obstacles.

2.15.0 Basic Considerations

Barbed wire obstacles are constructed primarily from issue materials; thus both logistical and construction estimates are involved. *Table 8-1* gives weights, lengths, and other data required for estimating truck transportation and carrying party requirements. *Table 8-2* gives the material and labor requirements for construction of various wire entanglements. *Table 8-2* is based on daylight work; for night work the man-hours must be increased 50 percent.

2.16.0 Requirements for a Defensive Position

Table 8-2 gives quantities and weights of material per linear foot of entanglement. When a layout to scale can be developed, the lengths of the various types of entanglements are scaled and the quantities and weights are computed. When a scaled layout cannot be prepared, the rule of thumb method may be used for estimating the required lengths of tactical and protective wire entanglements. If the length of front is taken as the straight-line distance between limiting points, the rules are as follows:

1. The length of tactical wire entanglement is 1.25 times the length of the front, times the number of belts, regardless of the size of the unit involved.
2. The length of protective wire entanglement for a defensive position is five times the length of the front being defended, times the number of belts. Since protective wire encircles each platoon area of a command, the protective-wire entanglement for units is 2.5 times the average platoon frontage, times the number of platoons involved.
3. Supplementary wire in front of the FLOT is used to break up the line of tactical entanglements. Its length is 1.25 times the unit's frontage, times the number of belts. The length of the supplementary-wire entanglement behind the FLOT is approximately equal to 2.5 times the distance from the FLOT to the rearmost reserve unit, times the number of belts. This rule of thumb is adequate for all units.

Summary

In this chapter, you were introduced to the different types of entanglements utilized by the Seabees. You learned for the purpose for each type and how to set up entanglements in a combat zone. You learned how many people are required to properly and safely place these entanglements. Entanglements are an important part of defense for the Seabees. They will enable you to control how the enemy gains access to your area of defense and allow you to set up traps to stop them. Learning how to place these entanglements is important for your life and for the lives of the Seabees on your team.

Assignment 8

Objectives

1. Identify design features of wire entanglements and recognize their construction and handling procedures.

Questions

1. Barbed wire entanglements are designed to slow the movement of (a) what type of troops with (b) what type of obstacle?

    1. (a) Airborne (b) natural
    2. (a) Infantry (b) natural
    3. (a) Airborne (b) artificial
    4. (a) Infantry (b) artificial

2. What are the three classifications for use of entanglements?

    1. Tactical, protective, or supplementary
    2. Protective, fixed, and supplementary
    3. Portable, protective, and tactical
    4. Tactical, protective, and fixed

3. What is one advantage of using portable barbed wire entanglements?

    1. For permanently closing gaps in lanes
    2. To permit assembly in forward areas
    3. For rapid installation in forward positions
    4. To prevent the enemy from evading

4. Antipersonnel obstacles should be positioned to allow for which of the following actions?

    1. To prevent the enemy from evading
    2. Adequate surveillance by the defenders
    3. To move through easily
    4. Throwing of hand grenades

5. What safety precautions should you take when handling barbed wire?

    1. Wear standard combat gear
    2. Wear standard barbed wire gauntlets
    3. Wear obstacle gloves
    4. Don’t grab the barbs

6. What characteristics of barbed-steel tape are the most significant?

    1. Width and thickness
    2. Weight and interval between barbs
    3. Width of barb and breaking load
    4. Weight and breaking load

7. What apron fence is the most effective obstacle that can be made with barbed tape?

    1. Single
    2. Double
    3. Triple
    4. Quadruple

8. What is the major disadvantage of barbed-steel tape?

    1. It requires a dispenser for installation
    2. It can be seen by the enemy
    3. Its breaking strength
    4. Its not recoverable for reuse

9. How can you increase the effectiveness of the standard double-apron fence?

    1. Make the top wire knee-high
    2. Raise the top wire to preclude stepping over it
    3. Place low wires 4 inches above the ground
    4. Both 2 and 3 above

10. What is the major advantage of concertina wire?

    1. It can be used repeatedly
    2. It is much harder to cut
    3. It is sold commercially
    4. Each of the above

11. When expanded, barbed-tape concertina comes in what lengths, in feet?

    1. 25
    2. 50
    3. 75
    4. 100

12. What is the proper way of tightening barbed-wire after it is installed?

    1. Rack it with a driftpin or short stick
    2. Use the M16 bayonet
    3. Assign two men to pull on the top strand
    4. Attach the wire to a truck and pull slowly

13. What step(s) is/are accomplished in phase one of installing a four-strand cattle fence?

    1. Unrolling the wire
    2. Laying out and installing the pickets and the wire
    3. Tightening the wire
    4. Installing the bottom fence wire with pickets

14. As an obstacle, the triple-standard concertina fence is better than what other type of fence?

    1. Single concertina
    2. Double concertina
    3. Double apron
    4. Triple apron

15. What type of barrier is the knife rest used for?

    1. Permanent
    2. Movable
    3. Semipermanent
    4. Unsecured

16. Trip wires should be placed about how many feet from the FLOT?

    1. 18 to 48
    2. 31 to 89
    3. 48 to 81
    4. 98 to 131

ASSIGNMENT 8

Entanglements

Directions: Select the correct answer from the list of alternates below each question in the end of chapter assignment. Write in the answer next to the corresponding question number below. Use this answer sheet as a reference to completing the online assignment related to this assignment.

1.	
2.	
3.	
4.	
5.	
6.	

7.	
8.	
9.	
10.	
11.	
12.	

13.	
14.	
15.	
16.	

Additional Resources and References

This chapter is intended to present thorough resources for task training. The following reference works are suggested for further study. This is optional material for continued education rather than for task training.

U.S. Army FM 5-34, Engineer Field Data, Department of the Army

Trainee Feedback

Center for Seabees and Facilities Engineering (CSFE) makes every effort to keep their courses up-to-date and free of technical errors. If you have a suggestion, found an error or inaccuracy, please write, FAX or email us by using the form below. Use one form for each comment and be sure to fill in the information as accurately and detailed as possible. Thank you for your assistance.

Write: CSFE
NCF Training Division (N7B)
3502 Goodspeed St.
Port Hueneme, CA 93043-4337

FAX: (805) 982-5508 / DSN 551-5508

E-mail: CSFE_CBCH@navy.mil

Trainee Feedback Form

Course: Seabee Combat Handbook, Volume ____, NAVEDTRA: _____

Course Date: _____ Chapter Number: _____ Page: _____

Paragraph: _____ Sentence: _____ Figure: _____ Frame/View: _____

Description: _____
_____
_____
_____
_____
_____

(optional) Corrective action: _____
_____
_____

(optional) Supporting reference(s): _____
_____

Your email address, if a response is requested: _____

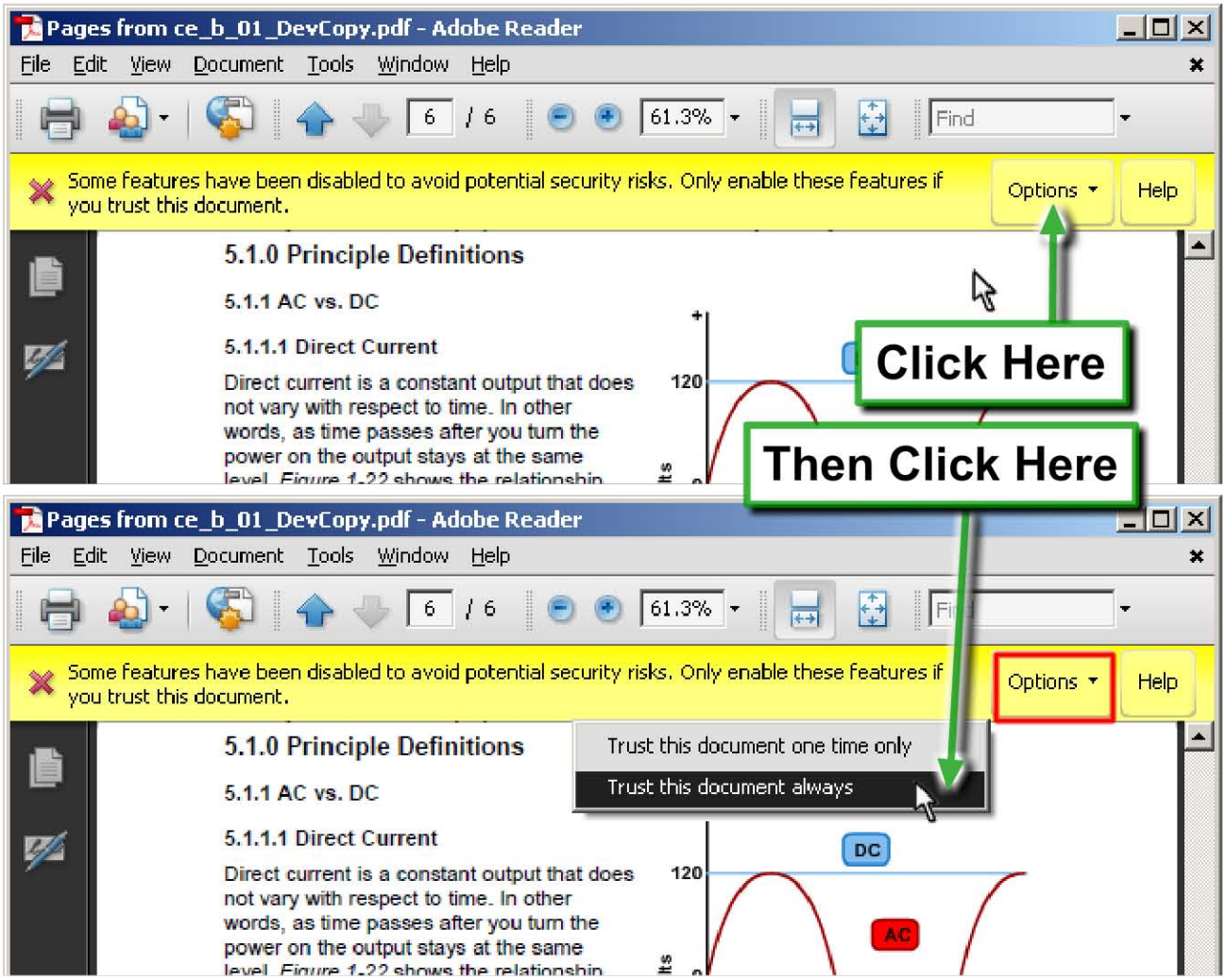
The Interactive features of this manual are currently disabled.

Many graphics will not appear correctly unless these features are turned on. You should either see a popup window, or a yellow banner at the top of the application. To enable the Interactive features of this manual follow the steps illustrated below:

If you see a popup window do the following:



If you see a yellow banner, do the following:



Once you have completed either of the above procedures the features will be enabled for this document, and this warning won't appear again after you leave this page.

Chapter 9

Chemical, Biological, Radiological, and Nuclear (CBR-N) Defense

Topics

1.0.0 Effects of CBR-N Weapons

2.0.0 CBR-N Contamination Detection and Identification

3.0.0 CBR Defense Responsibilities

4.0.0 CBR Unit Equipment

5.0.0 CBR Marking of Contaminated Areas

To hear audio, click on the icon: 

Overview

Although chemical and biological warfare has been outlawed by international agreements, the potential for such warfare is real. Likewise, radiological or nuclear warfare is an ever-present concern to the Seabees as well as all other U.S. military personnel. In this chapter, you will learn about the effects of Chemical, Biological, Radiological, and Nuclear (CBR-N) weapons on personnel and equipment. This information includes the symptoms of CBR poisoning and its first-aid treatment. You will also learn about Seabee CBR defense responsibilities, individual protective measures, and CBR defense equipment. Finally, you will learn about completing the Seabee's mission while under CBR conditions, CBR defense training, and how to mark contaminated areas.

Objectives

When you have completed this chapter, you will be able to:

1. Describe the effects of Chemical, Biological, Radiological and Nuclear (CBR-N) weapons.
2. Recognize the symptoms and effects of CBR-N agents.
3. Recognize Seabee CBR defense responsibilities.
4. Recognize and describe Seabee CBR defensive equipment.
5. Describe the MOPP and its limitations.
6. Recognize the markers used in CBR contaminated areas.

Prerequisites

There are no prerequisites for completing this manual.

Features of this Manual

This manual has several features which make it easy to use online.

- Figure and table numbers are italicized within the handbook text. Figure and table reference numbers are conveniently located next to (or near) the applicable handbook text.
- Audio and video clips are included in the text, with italicized instructions telling you where to click to activate the appropriate link.
- Review questions are included at the end of this chapter as the chapter assignment. To submit assignments log into https://www.courses.netc.navy.mil, go to “Student Services”, in the drop down click on “Active Courses”, go to "View/Submit Answers" next to the course you wish to submit answers for. Assignments may be submitted to the above Web site as they are completed, and instant scoring is available. Your completion letter is available as soon as you pass all assignments.
- A form at the end of each chapter allows your input for improving the manual or correcting errors to be brought to the attention of CSFE’s Technical Review Committee. Your input is important and will help keep this manual up to date and free of technical errors.

1.0.0 EFFECTS OF CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR (CBR-N) WEAPONS

CBR-N training needs to be integrated into all facets of individual and unit training. Sufficient training time must be allocated to ensure that actions required for initial survival and subsequent mission accomplishment are conditioned responses. Chemical agents are used to produce death, injury, temporary incapacitation, or irritating effects. (Screening smokes are not toxic unless they are inhaled in large amounts. Incendiaries are used primarily to start fires. These two agents are not discussed further.) Broadly speaking, there are three types of antipersonnel agents: casualty, incapacitating, and harassing.

Casualty agents are highly poisonous and are intended to kill or seriously injure. Included in this group are nerve, blister, choking, and blood agents. Nerve agents, as a group, are probably the most effective because only small doses are needed to produce death. Some agents are so persistent (when dispersed as a liquid) that they can remain effective for several days. They enter the body by the victim's breathing or swallowing or through the skin of the victim. Blister agents cause severe burns, blisters, and general destruction of body tissue. When they are inhaled, the lungs are injured. Choking agents inflame the nose, throat, and particularly the lungs. Blood agents interfere with the distribution of oxygen by the blood.

Some casualty agents have a cumulative effect, which means that successive doses add to the effect of each preceding dose. You might receive a nonlethal dose of a nerve agent, for example, followed within a few hours by another nonlethal dose. The cumulative effects of the two exposures, however, could be sufficient to cause death.

A new development is the Nonlethal Incapacitating Agent. It renders personnel incapable of performing their duties by interfering with the mental processes that control bodily functions. Reactions vary among individuals. One person might go into shock, and still another might have a feeling of extreme fatigue. These agents are difficult to detect because most of them are colorless, odorless, and tasteless.

Harassing agents include tear and vomiting gases that cause temporary disability. Tear gases are used mainly for controlling riots, but they have been used in warfare with varying degrees of success. Without a gas mask, the individual is rapidly incapacitated, but the effects disappear in 5 to 10 minutes after the person dons a protective mask or gets to fresh air.

Vomiting gases are useful when the enemy intends to launch an attack with casualty agents. They cause extreme nausea and vomiting, requiring those who have been exposed to remove their masks, thus exposing personnel to the casualty agents.

1.1.0 Effects of Biological Weapons

Biological operations use living organisms to cause disease or death. They act on living matter only. Most organisms that produce disease enter the body of the victim and grow in the human tissues. Some organisms produce toxins (poisons) in food or water, and the poisons cause disease after the victim eats or drinks it.

Large scale biological attacks by an enemy are as yet an untried weapon. As far as it is known, there has been no open attempt by any country to use this form of attack. Biological agents, however, have certain characteristics that favor them over other types of warfare, and the possibility of their use in the future must be anticipated. Only small amounts of the agents are needed, because the organisms are alive and multiply in the

victims. Moreover, they are difficult to detect and slow to identify. A whole ship's company might be infected before the medical department realized a disease existed on board.

The most efficient means of delivering biological agents on a large scale is through aerosols, which generally are invisible and odorless. Aerosols can be released from aircraft in bombs or direct sprays, from surface vessels on onshore winds, or from any number of explosive munitions, such as projectiles, guided missiles, and rockets. Animals and insects can be used as carriers to spread biological agents.

Another method of quickly infecting large numbers of people is for saboteurs to contaminate a water supply. Diseases, such as typhoid fever, cholera, and influenza, can be spread by infecting water, milk, and food supplies with the proper microorganisms.

1.2.0 Effects of Nuclear Weapons

Nuclear weapons produce explosions of great force and heat and release nuclear radiation. Their primary purpose is the mass destruction of property and personnel. Their effects are divided into three categories: blast, heat, and nuclear radiation.

1.2.1 Blast

Injuries caused by blast can be divided into primary (direct) injuries and secondary (indirect) injuries. Primary blast injuries result from the direct action of the air shock wave (overpressure) on the human body. The greater the size of the weapon, the greater the effective range of the blast wave will be with a subsequent increase in casualties.

Secondary blast injuries are caused mainly by collapsing buildings and by timber and other debris flung about by the blast. Personnel may also be hurled against stationary objects or thrown to the ground by high winds accompanying the explosion. Injuries sustained are similar to those resulting from a mechanical accident, such as bruises, concussions, cuts, fractures, and internal injuries.

At sea, the shockwave or base surge accompanying an underwater burst will produce various secondary injuries. Casualties resemble those caused by more conventional underwater weapons, such as mines and depth charges; but instead of being localized; they extend over the entire ship. Injuries also will result from personnel being thrown against fixed objects or structures. Equipment, furniture, boxes, and similar gear, when not secured properly, can act as missiles and cause many injuries.

Frequently, hemorrhage and shock are serious complications of blast injuries. The importance of shock cannot be overemphasized, because it is often the main consideration in determining the fate of the patient.

1.2.2 Heat

Heat from nuclear weapons causes burns. These burns can be grouped into two categories: primary and secondary. Primary burns are a direct result of the thermal radiation from the bomb. Secondary burns are the result of fires caused by the explosion.

As with blast injuries, shock is commonly associated with extensive burns. Burns are also subject to infection, which may produce serious consequences.

Flash burns are likely to occur on a large scale as a result of an air or surface burst of a nuclear weapon. Because thermal radiation travels in straight lines, it bums primarily on

the side facing the explosion; but under hazy atmospheric conditions, a large proportion of the thermal radiation may be scattered, resulting in burns received from all directions. Depending on the size of the weapon, second-degree burns may be received at distances of 25 miles or more.

The intense flash of light that accompanies a nuclear burst may produce flash blindness, even at a range of several miles. Flash blindness is normally of a temporary nature since the eyes can recover in about 15 minutes in the daytime and in about 45 minutes at night. A greater danger lies in receiving permanent damage to your eyes caused by burns from thermal radiation, which may occur 40 miles or more from a large-yield nuclear weapon.

1.2.3 Nuclear Radiation

Nuclear radiation consists of four types: alpha particles, beta particles, neutrons, and gamma rays.

Alpha and beta particles can be ignored as initial radiation because they are very short-range; however, they can be a hazard as residual radiation. Alpha particles have little penetrating power; but if they are ingested into the body, they can cause serious harm. Beta particles also are of little concern unless they are on the body (in dust, dirt, etc.) or get into the body.

Neutrons are a direct hazard only during the initial radiation phase and then only in the general area of ground zero. In the residual phase, however, they cause whatever material absorbs them to become radioactive and emit gamma rays and beta particles.

Gamma rays (similar to, but more powerful than, x-rays) are the most hazardous form of radiation. They can travel long distances in air and have great penetrating power, making it difficult to provide sufficient shielding to protect personnel.

Radiation hazards are of three types: penetration dose, skin dose and internal contamination.

Penetration doses and internal contamination have the most serious effects. You can be protected against penetration doses by proper shelter.

Internal contamination can be avoided by wearing the protective mask and not eating or drinking food and water until they are declared safe.

Skin doses, which cause injuries similar to burns, can be reduced by wearing proper battle dress.

2.0.0 CBR-N CONTAMINATION DETECTION AND IDENTIFICATION

For Seabees to carry out their mission, they must be able to detect and identify CBR agents immediately. The very nature of CBR agents, however, makes it difficult to detect and identify them.

In a nuclear attack for instance, you know an attack is taking place because you can see it, hear it, and feel it. However, you cannot see the nuclear radiation that can be just as deadly over a period of time as the blast itself. In the same invisible way, biological agents can be present with the possibility of no one knowing until it is too late. Recent developments in chemical operations make some of the chemical agents colorless and odorless.

You must learn the symptoms of each type of attack so you can take the proper action when exposed and you can apply the correct self-aid and first-aid measures.

2.1.0 Symptoms of Chemical Agent Contamination

Chemical agents make you a casualty when your body comes in contact with a bigger dose than it can withstand. The limits of tolerance of the human body extend from short periods of exposure and low concentrations of certain agents to extended periods of exposure and high concentrations of certain other agents. Furthermore, the limits of tolerance to specific agents vary with individuals. In any event, your principal concern is recognizing the symptoms and relieving the effects of exposure before the limit of exposure is exceeded.

2.1.1 Nerve Agent Symptoms

Symptoms of nerve agent contamination are a runny nose; tightness of chest with difficulty in breathing; contraction of eye pupils; and nausea, cramps, headache, coma, and convulsions. All of these symptoms can take place in 30 seconds when the dose is sufficiently heavy.

Vapors of the G- (GA=Tabun, GB=Sarin and GD=Soman) or V- (VX gas) series nerve agents, even in low concentrations, cause contraction of the eye pupils. This action affects the sight, especially in dim light, and induces a headache. After a brief exposure to the vapors, a feeling of tightness in the chest may be noticed. The liquid substance does not injure the skin but penetrates it and poisons the body. Contraction of the pupils, in such an instance, may not appear as a warning sign.

A 1- to 5-minute exposure of personnel not wearing protective masks for low concentrations of G- or V-agent vapors causes difficulty in vision. Slightly greater exposure causes headache, nausea, pain in the chest, and more serious visual difficulties. Exposure of unbroken skin to vapor alone, however, entails little danger of serious injury.

Liquid contamination from a nerve agent to the skin is a real hazard. One of the first signs of exposure when liquid contaminates the skin may be excessive sweating and twitching of the muscles at the site of contamination. Small amounts of liquid left undisturbed on the skin can cause death in a matter of a few minutes. The entrance to the body is even more rapid through the surface of the eyes and through the linings of the mouth and nose. A lethal dose can be absorbed as rapidly by getting liquid in the eyes as by inhaling concentrated vapor. When poisonous vapors are swallowed, the first symptoms are excess flow of saliva, intestinal cramps, nausea, vomiting, and diarrhea. When the nerve agent is absorbed into the system after the victim is exposed to liquid or vapor, the symptoms may be generalized sweating, difficulty in breathing, muscular weakness, and eventually convulsions, paralysis, and unconsciousness.

2.1.2 Blister Agent Symptom

Immediate contact with liquid mustard or mustard vapor causes no eye or skin pain or any other immediate symptoms. Exposure to mustard gas for more than half an hour, however, produces these symptoms: Half an hour to 12 hours after exposure, the contaminated eyes water, feel gritty, and become progressively sore and bloodshot. The eyelids become red and swollen. Infection frequently results.

Mustard vapor will burn any area of the skin, but the burn will be most severe in moist areas (neck, private parts, groin, armpits, bends of knees, and elbows). Redness of the skin follows in one half hour to 36 hours after exposure. This condition may be

accompanied by intense itching, and blisters may then appear. Stiffness, throbbing pain, and swelling may also be observed.

A few hours after breathing mustard vapor, a victim may experience irritation of the throat, hoarseness, and coughing. After severe exposure, the lining of the respiratory system swells and interferes with breathing. Frequently, pneumonia develops.

When the whole body is exposed to mustard vapor, the body goes into a state of shock. This reaction is accompanied by nausea and vomiting.

Nitrogen mustards irritate the eyes before they affect the skin or respiratory system. The action of nitrogen mustards on the eyes occurs in a shorter time than does mustard. Even low concentrations of these agents may seriously decrease vision during or shortly after exposure. Later effects are similar to those of mustard. Contact of these agents with the skin produces damage like that produced by mustard, and their effects on the respiratory system are also similar.

2.1.3 Blood Agent Symptom

Symptoms produced by blood agents, such as Hydrogen Cyanide, depend upon the concentration of the agent and the duration of the exposure. Typically, either death occurs rapidly or recovery takes place within a few minutes after removal of a victim from the contaminated area. When the victim inhales a high concentration of a blood agent, the victim begins to breathe more deeply within a few seconds, has violent convulsions after 20 to 30 seconds, stops breathing regularly within 1 minute, then gives occasional shallow gasps, and finally the heart stops only a few minutes after the onset of exposure. After moderate exposure, giddiness, nausea, and headache appear very early, followed by convulsions and coma. Long exposure to low concentrations may result in damage to the central nervous system. Mild exposure may produce headache, giddiness, and nausea, but usually recovery is complete.

The effects of Cyanogen Chloride combine the properties of two agents: chlorine and cyanogen. The chlorine properties induce coughing, dryness of the nose and throat, tightness across the chest, and smarting and watering of the eyes, resulting finally in the accumulation of fluid in the lungs. Cyanogen is similar to hydrogen cyanide and, like that agent, causes giddiness, headaches, unconsciousness, convulsions, and death.

2.1.4 Choking Agent Symptom

In low concentrations, choking agents produce an action on the respiratory system that results in the accumulation of fluid in the lungs. This effect may lead to death. High concentrations produce death for the same reason, but the upper respiratory tract may be involved as well. Exposure to choking agents may produce immediate dryness of the throat, coughing, choking, tightness across the chest, headache, nausea, and at times, smarting and watering of the eyes. Symptoms usually are delayed, however, and it is possible that no immediate symptoms will appear when you are exposed to a fatal dose.

Even mild exposure to a choking agent that is accompanied by immediate symptoms may cause fluid to accumulate in the lungs within 2 to 24 hours after exposure. Shallow and rapid breathing, hacking and painful cough, frothy saliva, and an ashen-gray color of the skin indicate the presence of this fluid.

2.1.5 Vomiting Agent Symptom

Exposure to vomiting agents is followed soon by a pepper-like burning of the eyes, nose, throat, and air passages. The burning sensation is accompanied by a flow of tears and repeated coughing and sneezing. These symptoms increase in severity for several

minutes, even after the victim dons a mask. The victim becomes sick to the point of vomiting. When the mask is removed, the victim is then exposed to even more hazardous agents.

2.1.6 Tear Agent Symptom

Tear agents (also called riot control agents) are local irritants which, in low concentration, act primarily on the eyes, causing intense pain and a considerable flow of tears, stinging of moist, warm skin, and irritation of the nose. High concentrations affect the upper respiratory tract and lungs and cause nausea and vomiting. The agents may be either solids or liquids and may be dispersed as vapors or smokes. o-chlorobenzylidene malononitrile (CS) is the most effective, causing incapacitation 20 to 60 seconds after exposure. Recovery can be expected 5 to 10 minutes after the victim is breathing fresh air.

2.1.7 Incapacitating Agent Symptom

Incapacitating agents can cause mental symptoms and may also produce physical symptoms, such as a staggering gait, dizziness, and blurred vision. Some of these agents cause fainting spells, and others cause severe muscle weakness. The mental symptoms often resemble alcoholic drunkenness; for example, individuals may act silly, giggle, or become angry and belligerent similar to a “fighting drunk.” Sometimes incapacitating agents can cause hallucinations. (Victims may imagine that they see snakes or enemy soldiers, or they may imagine that colors have changed.) Many of these incapacitating gases prevent sleep. Some people may stay wide-awake for 4 days and be mentally confused for the whole period. These agents do not kill, but they can make you unfit for duty. Many of them do not produce effects until several hours after inhalation. These effects can last from 8 hours to 4 days.

2.2.0 Symptoms of Biological Contamination

In the early stages of any biological disease, the general symptoms are fever, malaise, and inflammation.

The degree of fever varies with the individual, depending on their resistance, and serves as a rough guide to the severity of infection. Often a violent chill precedes the fever. Whether the victim gets the chill or not, the fever is usually one of the earliest symptoms.

Malaise is a feeling of bodily discomfort and weakness. There may be nausea, dizziness, loss of appetite, and general aches and pains.

Inflammation is caused by the reaction of body tissues combating and sealing off an infection. In almost every case there is pain, redness, and swelling. Some types of infection result in a characteristic rash, making it possible for the doctor to make an early diagnosis.

2.3.0 Symptoms of Nuclear Radiation

The first symptoms of exposure to nuclear radiation are nausea and vomiting. Later (2 weeks or more) symptoms are diarrhea, loss of hair, loss of weight, sore throat, and skin hemorrhage. Death rates depend on the amount of the dose and the general physical condition of the victim. Unless a very heavy dose is received, ultimate recovery can be expected in most instances.

3.0.0 CBR DEFENSE RESPONSIBILITIES

The battalion commander is responsible for planning the overall CBR defensive measures for a Seabee's encampment. The battalion commander then presents to the battalion those requirements for defense measures that should be provided by other forces.

Protective measures used against other weapons give only partial protection against CBR attacks. Provisions must be made for CBR defense, such as the following:

- Greater emphasis on unit separation, dispersion, and mobility
- Increased air and ground reconnaissance
- Training and indoctrination of personnel
- Warning, reporting, detection, and identification of CBR agents and hazards
- Individual and collective protection
- Decontamination of personnel, equipment, supplies, and terrain, when directed
- Plans for handling mass casualties, to include medical operations and first aid

3.1.0 Chemical defense

The best defense against a chemical attack is constant monitoring with equipment to detect chemical agents as soon as possible. To provide adequate time to take protective measures, commanders should use all available chemical detection equipment.

The protective measures taken by individuals and units when operating under the threat of chemical attack or in a chemical environment are governed by the nature of the threat, mission, situation, and weather. Movement of troops and supplies should be planned so contaminated terrain is avoided to the maximum extent possible. Contaminated terrain is crossed only when absolutely necessary and then as quickly as possible. Preferably, you should move in vehicles at speeds and intervals that minimize contamination. When the situation and mission permit, heavy work-rate activities of personnel dressed in chemical protective clothing and equipment should be minimized. Essential work should be planned for the coolest part of the day, when possible.

3.2.0 Protective Measures before Chemical Attack

In any combat situation, the commander should designate a level of Mission Oriented Protective Posture (MOPP) for the unit. MOPP is discussed in detail later in this chapter. The following protective measures must be taken before a chemical attack.

3.2.1 Extended Wear of Protective Clothing

Based on the MOPP level designated by the commander, the individual may have to adapt to requirements for wearing their protective clothing and equipment for extended periods. The amount of time required to put all of these items on during a chemical attack exceeds the amount of time required to receive a casualty-producing dose of chemical agent.

3.2.2 Chemical Detector Paper/Kits

The M8 Chemical Agent Detector Paper is used to detect the presence of liquid V type nerve, G type nerve, and H type blister agents. When a sheet is brought in contact with liquid nerve or blister agents, it reacts with chemicals in the paper to produce agent-specific color changes. The paper is blotted on a suspected liquid agent and observed for a color change (liquid agent absorption). V type nerve agents turn the paper dark green; G type nerve agents turn it yellow, and blister agents (H) turn it red. The paper cannot be used to detect chemical agents in water, vapor, or aerosols.

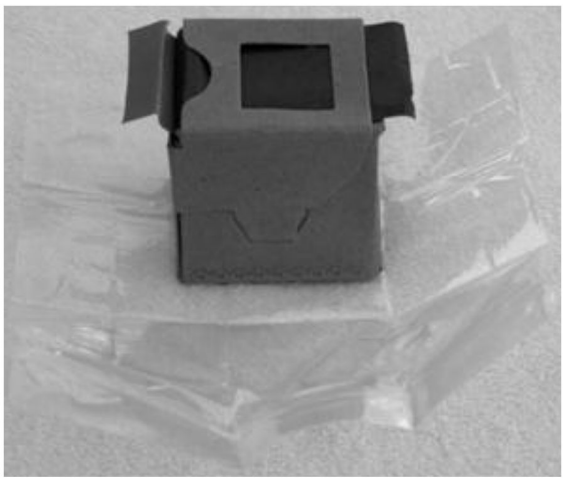


Figure 9-1 — M9 chemical agent detector paper.

The M9 Chemical Agent Detector Paper (*Figure 9-1)* is placed on personnel and equipment to identify the presence of liquid chemical agent aerosols. It will turn pink, red, reddish brown, or red-purple when exposed to liquid agents. It can detect (but not identify) the specific agent. As soon as it indicates the presence of chemical agents, protective action must be taken.

The M256A1 Chemical Agent Detector Kit is a portable, expendable item that is capable of detecting and identifying hazardous concentrations of chemical agents. It is used after a chemical attack to determine if it is safe to unmask or reduce the protective posture level. It also determines the type of agent present and helps confirm the presence or absence of hazardous concentrations of an agent. Each kit can be used to test for blister agents, blood agents, nerve agents, and lewisite. Each test spot or detecting tablet develops a distinctive color that indicates whether a chemical agent is or is not present in the air.

3.2.3 Alertness and Proficiency

Individuals must remain alert and constantly aware of the chemical threat, especially when duty requirements preclude the wearing of full protective equipment. Individuals must understand the chemical alarms and signals and be proficient in attaining the maximum level of protection when alerted to a chemical attack.

3.2.4 Protection of Individual Equipment

To the extent possible, individuals must protect equipment and supplies against liquid chemical agent contamination by keeping them organized and covered. Hastily constructed fighting position covers, ponchos, shelter halves, or other suitable materials can be used for protection. Individuals should wear full protective clothing and equipment when sleeping and, to the extent possible, cover themselves and their equipment before they go to sleep.

3.3.0 Protective Measures during Chemical Attack

A chemical attack may come directly in the area in which individuals are located or upwind from that area. In either case, when alerted to a chemical attack the following immediate defensive actions must be taken:

- Stop breathing.
- Don protective mask.
- Give the alarm.
- Don MOPP level 4 unless otherwise directed.
- Continue the mission and wait for further orders.
- When the situation permits, assist others who need help.

For MOPP level 4, personnel should completely encapsulate themselves by closing their overgarments, adjusting all drawstrings to minimize the likelihood of any openings, and putting on their protective gloves. MOPP level 4 is used when the highest degree of protection is required, or if CB agents are present but the actual hazard is not determined. Once the hazard is identified and risk assessment measures are employed, the overgarment may be left open.

3.4.0 Protective Measures after Chemical Attack

If an adversary uses an air-bursting chemical munition, mission permitting, personnel will avoid outside activities to the maximum extent possible after an attack during the chemical droplet fall phase. Additionally, the chemical droplet fall phase could last up to approximately 60 minutes. The length of time depends on factors such as meteorological data and the weapon's height of burst. Outside activities could result in erroneous initial reconnaissance results and unnecessarily contaminated personnel and equipment.

To avoid contaminated surfaces/areas, personnel should minimize contact with potentially contaminated surfaces until there are indications that surface contamination is no longer a hazard. Obtain and report observations or evidence of an attack. Personnel should also provide reconnaissance and assessment information for all types of damage, hazards, and chemical agents.

Personnel should survey, control, and mitigate health hazards (treat and evaluate casualties) and unit commanders should adjust MOPP to the lowest possible level consistent with identified hazards. Medical staffs should clearly document exposure in the medical records of those personnel who have been exposed.

Once the situation permits, the detection efforts determine the extent and duration of the residual hazards. Plan and implement decontamination and contamination containment actions. These actions are planned and implemented to minimize the operational impacts of contamination.

When the area has been determined to be all clear to conduct unmasking procedures, unit commanders should revert to an appropriate MOPP level based on the current threat in conjunction with the all-clear signal. Personnel engaged in passive-defense functions should repair and resupply defense equipment in preparation for follow-on attacks.

3.4.1 Procedure When a Detector Kit is Available

Chemical detector kits may not detect all agents. You should consider also using unmasking procedures listed below in paragraph 3.4.2, even if the detector is available.

These procedures take approximately 15 minutes. After all tests with the kit, including a check for liquid contamination, have been performed and the results are negative, the senior person should select one or two individuals to start the unmasking procedures. If

possible, move to a shady place. Bright, direct sunlight can cause pupils in the eyes to constrict, giving false signs of nerve agent exposure. The selected individuals unmask for 5 minutes and then reseal and clear their masks. Observe them for 10 minutes.

If no symptoms appear, the commander/leader considers issuing the all-clear signal for unmasking. Continue to watch the personnel for possible delayed symptoms. Always have first aid treatment immediately available in case it is needed.

3.4.2 Procedure When a Detector Kit is Not Available

Unmasking procedures if a Chemical Detector Kit is not available takes at least 35 minutes. Find a shady area. Use M8/M9 paper to check the area for possible liquid contamination. When a reasonable amount of time has passed after the attack, the senior person should select one or two individuals. They take a deep breath, hold it, and break the seal for 15 seconds, keeping their eyes wide open. They then clear and reseal their masks and are observed for 10 minutes. If no symptoms appear, the selected individuals break the seal of their mask, take two or three breaths (keeping their eyes wide open), and clear and reseal their masks. Observe them for 10 minutes. If no symptoms appear, the selected individuals unmask for 5 minutes and then remask. If no symptoms appear in 10 minutes after remasking, the commander considers issuing a directive for an all-clear. This process takes a minimum of 35 minutes. Continue to observe the selected personnel in case delayed symptoms develop.

3.5.0 Protection of Unit Equipment and Supplies

Because contaminated equipment and supplies pose a threat to personnel, covers should be used to protect equipment and supplies stored outdoors, if possible. The following guidance is appropriate for combat, combat support, and combat service support units.

3.5.1 Equipment

Important items of equipment must be covered. Plastic sheets serve as excellent covers because they are nonporous. If plastic material is not available, tarpaulins or other suitable material may be used. If nothing else is available, dense foliage will provide some protection.

3.5.2 Packaged Food Items

Vapor, aerosol spray, or liquid chemical agents can contaminate food. The type of food, type and amount of agent, and effectiveness of protective measures influence the edibility of food. Food not in protective packages generally presents the major problem. Chemical agents may penetrate packaged food when it is left exposed over an extended period of time.

3.5.3 Unpackaged Food Items

Oily and fatty unpackaged foods are particularly vulnerable to chemical contamination. These foods are protected from contamination when stored in containers, such as field iceboxes and refrigerators, if the sealing gaskets are serviceable. Contaminated unpackaged food must **NOT** be eaten!

3.5.4 Water

Medical personnel are responsible for recommendations on the potability of water. Water that is not in sealed containers may become contaminated. Water suspected of contamination should not be consumed until tested and declared safe.

3.6.0 First Aid and Self-Aid

First aid includes the immediate actions required to prevent further injury or complications from the effects of chemical agents. First aid necessarily includes the prompt removal of agents from the eyes and decontamination of the skin to avoid casualties from lethal liquid agents. Therefore, first aid must include performing self-aid or personal decontamination, automatically and without orders when it is required. First aid also includes the use of appropriate medications or actions to reduce the effects of the agent, such as the use of the nerve agent antidote injector for nerve agent poisoning. Each individual must be thoroughly trained in both first aid and personal decontamination so they can perform these actions quickly.

When the skin of an individual becomes contaminated, it must be decontaminated immediately. Skin decon is the neutralization or removal of contamination from exposed portions of the skin. If the contaminated person is incapacitated, another person must perform the decontamination.

For decontaminating skin, each Seabee receives Reactive Skin Decontamination Lotion (RSDL). The lotion removes chemical agents or the T-2 toxin and also reacts with the chemical agents, rapidly neutralizing them so they are non-toxic. RSDL must be applied to exposed skin (intact) as soon as possible after exposure to a chemical agent. The lotion is impregnated in a sponge pad packaged as a single unit in a heat-sealed foil pouch.

Protect the kit from temperatures above 110°F (43°C) and below 32°F (0°C). The solutions are flammable and unstable in storage at temperatures above 110°F (43°C) or for prolonged periods of time in sunlight.

Shelter is necessary to prevent further contamination during the decontamination process. If no overhead cover is available, throw a poncho or tarp over your head before beginning decontamination.

3.6.1 Nerve Agents

If you are told that your pupils are getting very small or if you are having trouble breathing and your chest feels tight, use the atropine Nerve Agent Antidote Kit (NAAK), Mark I (*Figure 9-2*).

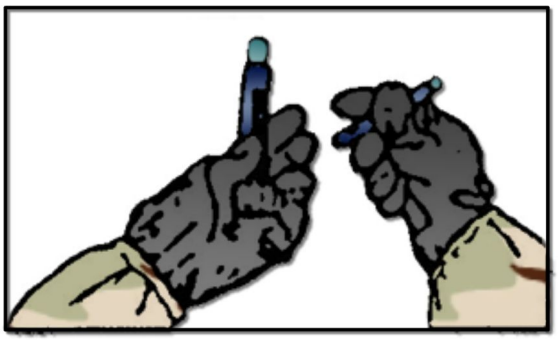


Figure 9-2 — Nerve agent antidote kit.

The injectors contain medications to treat the initial symptoms of nerve agent poisoning. But, most importantly, it will resolve the more serious effects of nerve agent sickness. The injectors are antidotes, not a preventive device; therefore, only use the injectors when you actually experience symptoms of nerve agent poisoning. The directions for use are as follows:

1. Put on the protective mask.
2. Remove a NAAK, Mark I, from the protective mask carrier.
3. Inject the thigh with the first injector (*Figure 9-3*) from the kit (atropine, small auto injector). Hold the injector against the thigh for at least 10 seconds.
4. Remove the injector.
5. Follow immediately with the second injector (2-PAM chloride, large injector) and inject the thigh. Hold the injector against the thigh for at least 10 seconds.
6. Remove the injector and place each injector needle through the pocket flap of the over garment. Bend each needle to form a hook.
7. Massage the injection site, if time permits.
8. The interval between injecting each set of auto injectors is 10 to 15 minutes when symptoms persist or recur. A Seabee must not administer more than three NAAK sets. The administration of more than three sets must be authorized by medical support personnel.

ATROPINE #1



1. Pull small injector out of plastic holder.



2. Hold device by labeled part and push green end against outer thigh until you feel the injector function. Hold firmly in place for ten seconds. *

PRALIDOZIME CHLORIDE #2



3. Pull large injector out of plastic holder.



2. Hold device by labeled part and push black end against outer thigh until you feel the injector function. Hold firmly in place for ten seconds. *

***NOTE:** **Holding the injector firmly in place for ten seconds will be important if a real injection were being given to allow the drug to enter the body**

Figure 9-3 — Using the NAAK.

WARNING

If within 5 minutes after the administration of any set of injections, your heart beats very rapidly AND your mouth becomes very dry, do **NOT** give yourself another set of injections.

When an individual experiences severe symptoms from nerve agent poisoning and is unable to administer self-aid, a buddy must perform the following aid measures:

1. Mask the casualty.
2. Using the NAAK belonging to the victim, administer three sets of injections immediately and in rapid succession in the thigh muscle of the leg.
3. After the third dose has been administered, give the single dose of Diazepam, this is also known as the Convulsive Antidote, Nerve Agent (CANA).
4. Hook the expended auto injectors to the over garment pocket flap of the victim.
5. Administer the back pressure arm-lift method of artificial ventilation if breathing is difficult or has ceased.
6. Seek medical attention as soon as possible. Continue to perform your duties if you feel relief from the atropine and can breathe freely again. Dryness of the

mouth is a good sign. It means that you have had enough atropine to overcome the dangerous effects of the nerve agent.

If you should get a splash of liquid nerve agent in your eyes, instant action is necessary to avoid serious injury. Obtain water as fast as possible, tilt your head back so your eyes look straight upward, slowly pour water into the your eyes, and flush them out. Hold your eyes open with your fingers, if necessary. Pour the water slowly so the irrigation lasts not less than 30 seconds. This irrigation must be done in spite of the danger of breathing nerve gas vapor. Don your mask quickly after irrigation is complete. Then, if the symptoms of nerve gas poisoning develop, give yourself an injection from the NAAK, Mark I.

If liquid nerve gas gets on your skin or clothing, fast action is needed to get rid of it. Immediately use the M291 decontamination kit. Then carry on with your combat duties. Meanwhile, watch for muscles twitching in the contaminated area. If twitching does not develop in the next half hour and there is no tightness in your chest, you have been decontaminated successfully.

If twitching of the muscles in the area of contamination does develop, do not wait for other symptoms to appear. Give yourself the injections from the NAAK, Mark I, at once. If no other symptoms develop, one series of injections is enough.

3.6.2 Blister Agents

Casualties of blister agents, such as HD (distilled mustard); will exhibit redness and inflammation of the eyes. Usually several hours after exposure, reddening of the skin appears, followed by the appearance of blisters. There is NO first aid for blister agents, only decontamination. Blister agent effects are delayed for several hours to days. To decontaminate your eyes, flush with plain water repeatedly. Any blister agents on the skin and clothing should be removed using the M291 decontamination kits. Seek medical care as soon as possible. If evacuation to a medical facility is required, blister agent casualties receive the same treatment given other burn victims.

3.6.3 Blood Agents

Agents, such as AC and CK, enter the body by inhalation and produce symptoms ranging from convulsions to coma. They act on the body by interfering with the ability of oxygen-carrying cells to transfer oxygen to other body tissue. They agents may also have an irritating effect on nasal passages.

There is currently no self-aid or buddy aid treatment for blood agent symptoms. Affected personnel should seek medical attention.

3.6.4 Choking Agents

This agent produces coughing, choking, nausea, and headaches in casualties. Delayed effects include rapid and shallow breathing, painful cough, discomfort, fatigue, and shock. First aid includes immediate masking. Masking may prevent further damage. No specific first aid, other than efforts to prevent shock, is available.

3.6.5 Vomiting Agents

For protection against vomiting agents, put on your mask and wear it in spite of coughing, sneezing, salivating, or nausea. If necessary, briefly lift the mask from your face to permit vomiting or to drain saliva from the face piece. Clear your mask each time you adjust it to your face and before you resume breathing. Carry on with your duties as

vigorously as possible; this helps to lessen and shorten the symptoms. Combat duties can usually be performed in spite of the effects of vomiting agents.

3.6.6 Tear Agents

When liquid or solid agents have entered your eyes, force your eyes open and flush them with water. Put on your protective mask, cover the outlet valve and voice meter, and blow hard to clear the mask. Keep your eyes open as much as possible. When your vision clears, continue to perform your duties. When it is safe to remove your mask, blot away tears, but do not rub your eyes. Face into the wind to evaporate all traces of the chemical.

3.6.7 Incapacitating Agents

By the time a victim who is exposed to an incapacitating agent realizes something is wrong, that person may be too confused mentally to handle their own decontamination. These victims should be taken to medical personnel immediately. If several people are affected, it may be necessary to confine them temporarily under guard to prevent accidents. These personnel must not be allowed to enter critical or dangerous spaces until complete recovery is achieved, because these victims may not be responsible for their actions. In addition, some of these agents prevent sweating, which increases the danger of heat stroke on hot days.

3.7.0 Personnel Decontamination

Decontamination can be accomplished by the removal, neutralization, absorption, or weathering of the chemical agent. The primary purposes of decontamination are to prevent casualties and to remove obstacles that may prevent mission accomplishment.

Individual decontamination or self-aid is performed by an individual with materials on hand. It is performed by the individuals on themselves and the equipment they use. It is performed as soon as practical and is usually sufficient to allow the individual to carry on with their assigned mission. .

Unit decontamination is an organized effort performed by personnel of the unit, with equipment available to the unit, when directed by the commander, and under the supervision of trained CBR specialists. All officers and qualified CBR specialists should be prepared to act as supervisors of decontamination teams when required.

3.8.0 Support Level Equipment Decontamination

Equipment decontamination stations are located as far forward upwind as possible and are normally run by a specialized decontamination team or unit.

3.9.0 Biological Defense

Protective measures against a biological threat include training, immunization of personnel, and strict personal hygiene.

3.10.0 Biological Defense Training

Training for defense against biological agents must stress the necessity for an alert and questioning attitude toward any indication that biological agents may have been used. Although knowledge of these agents is important, there must be no unreasonable fear of disease from a suspected biological attack. Personnel should be instructed not to

repeat or exaggerate rumors. Seabees should also know the following facts about a biological attack.

- It is normally impossible to recognize or detect.
- It may be used to supplement other types of attack.
- It may be used to cause either delayed death or incapacitation for strategic purposes.

3.11.0 Prevention of Disease

Casualties from a biological attack can be reduced by using the following preventive measures:

- Strict personal hygiene
- Immunization
- Quarantine of contaminated structures and areas
- Instruction in the proper care of cuts or wounds
- Use of approved sources of food and drink
- High standards of personal hygiene and, when practical, avoidance of practices that produce a run-down conditionassisting personnel in fighting an infection;importance of good protective mask discipline and proper field sanitation measures must be emphasized

3.12.0 Indications of a Biological Attack

The following are indications that a biological attack has occurred:

- Low-flying aircraft that appear to be producing a mist or spray
- The function of any type of spray device
- Unusual types of bomblets found in the area
- Swarms of insects, such as mosquitoes, suddenly appearing after an aircraft has dropped containers that did not appear to have immediate effect

3.13.0 Defensive Measures after a Biological Attack

Units are not equipped with devices to indicate a biological hazard. After a suspected biological attack, individuals must continue wearing their protective masks until authorized to remove them by competent authority.

3.13.1 Decontamination of Personnel

After a suspected biological warfare attack individuals can decontaminate themselves by showering with soap and hot water. The fingernails and toenails should be thoroughly cleaned and the hairy parts of the body should be thoroughly scrubbed. Contaminated clothing must be washed in hot soapy water when it cannot be sent to a field laundry for decontamination. Cotton items may be boiled.

3.13.2 Decontamination of Outdoor Areas

Sunlight kills most microorganisms and usually decontaminates areas that are outdoors in direct sunlight. However, shaded areas may remain hazardous from several hours to several days. Decontamination of a large area is not feasible.

3.13.3 Decontamination of Indoor Areas

Personnel in a shelter or building that is suspected of being contaminated with biological agents should wear their protective masks until they leave the building.

3.13.4 Guarding Against Contamination

All exposed surfaces are assumed to be contaminated. Sealed containers, such as bottles and cans containing food and water, should be washed down and boiled before opening.

3.13.5 Report Sickness Promptly

Prompt reporting of sickness serves two major purposes:

1. It gives medical personnel the opportunity to identify the biological agent to which the individuals were exposed. Once the disease has been identified, effective medical measures can be taken.
2. It helps to prevent the spread of disease from person to person.

3.13.6 Treatment of Casualties

There are no self-aid measures for the diseases that are caused by agents. In comparison to measles, the symptoms of biological warfare diseases appear in a like manner. Although it may be a matter of days before the types of biological warfare agents are identified, medical personnel will direct the decontamination of these casualties.

Even though the Navy provides preventive shots for some diseases, additional shots have been developed that will be given to all hands if biological warfare ever occurs. If you contract a disease from biological warfare in spite of the shots, the sickness should be mild, and medical personnel will ensure that you receive the best treatment available.

3.14.0 Nuclear Defense

On a nuclear battlefield, units must be dispersed to the greatest extent possible consistent with the situation and the mission. Dispersed units present smaller targets and, hence, are less vulnerable. In contingency planning, the positioning, movement, and missions of units may require adjustment by the commanders to minimize the effects of nuclear bursts while maintaining the ability to continue construction operations and hold defensive positions. Defensive measures for individuals and units should include protection from blast, heat, and initial and residual radioactive fallout.

3.15.0 Defensive Measures Before a Nuclear Attack

When a nuclear attack is imminent, the best defense is to dig in. Earth is one of the best shielding materials available in the field. Seabee defensive positions, which vary from individual fighting positions to improved defensive positions, should be prepared whenever the tactical situation permits.

3.16.0 Fighting Positions

A properly constructed fighting position provides excellent protection against initial radiation. The deeper the fighting position, the more protection it provides. An overhead covering of earth or other material will help reduce the amount of thermal and initial nuclear radiation and fallout material from reaching the individual. However, this cover must be sturdily constructed to withstand the blast wave.

3.17.0 Field Shelters

Tunnels, caves, and storm drains provide effective shelter. Culverts and ditches can be used in an emergency, although they offer only partial protection. Vehicles made of steel, such as tank and armored personnel carriers, provide some protection. Buildings usually are not strong enough to provide effective shelter, but the middle floors or basement of a reinforced concrete or steel-frame building offers protection from all effects except the blast. Personnel should avoid the areas around windows and other openings.

3.18.0 Supplies and Equipment

Individual equipment and supplies not being worn should be placed in the fighting position. None of this equipment should be left unsecured because the blast wave converts them into lethal missiles. Unit supplies, particularly explosives and flammables, should be dispersed within the unit area and protected or shielded. Debris must be kept to a minimum and not be allowed to collect because it could become a fire hazard. Objects, such as radios, generator tools, and gas cans must always be secured to minimize the danger of flying debris caused by the blast wave.

3.18.1 Defensive Measures during a Nuclear Attack

A nuclear attack may come without warning. The first indication will be an intense light. Heat and initial nuclear radiation come with the light and the blast follows. There is little time to take protective measures since the blast wave travels at the speed of sound (about 1,000 feet per second). Individual defensive actions must be automatic and instinctive. Unit activities will be suspended for a short period while all personnel take cover. When a surprise attack is a possibility, all personnel not engaged in essential activities should remain undercover as much of the time as possible. Individuals who are exposed when a nuclear detonation occurs should do the following:

1. Immediately drop flat on the ground (facedown) or to the bottom of a fighting position.
2. Close your eyes.
3. Protect exposed skin from heat by putting hands and arms near or under your body. Keep your helmets on.
4. Remain down until after the blast has passed and debris has stopped falling.
5. Stay calm, check for injury, check weapons and equipment for damage, and prepare to continue the mission.

3.18.2 Defensive Measures after a Nuclear Attack

Following a nuclear attack, designated individuals should begin fallout monitoring, so fallout arriving in the unit area can be detected quickly. When warned of the arrival of

fallout and the tactical situation permits, individuals should take cover and remain protected until instructed otherwise.

A handkerchief or similar cloth may be worn over the nose and mouth if dust particles make breathing difficult or cause discomfort. The protective masks should not be used as a dust respirator. If it is necessary to remain in an area having fallout, individuals should dig in quickly, sweep fallout particles away from the area around fighting positions, and remain covered until fallout stops.

The skin and clothing of individuals exposed to fallout or who have traveled through a radiologically contaminated area may experience a skin rash. If the situation prohibits complete decontamination, then field expedient methods should be used to reduce the radiation hazard. Some of these methods that remove alpha and beta emitting particles include the following:

- Removal and vigorous shaking of clothing or brushing the clothing with brushes (avoid breathing dust)
- Removing dust from the hair and from under the fingernails
- Wiping exposed skin with a damp cloth

All personnel should bathe and change clothing as soon as the tactical situation permits. Remember that runoff water is contaminated, and appropriate defensive measures should be taken.

The requirement for decontamination of individual equipment, vehicles, weapons, and ammunition can be reduced, if, before fallout arrives, they are covered with materials such as tarpaulins or ponchos. An effective way to remove radiological contamination is to wash it with soap and water.

3.18.3 Contamination Avoidance

Contamination avoidance can help minimize exposure by doing the following:

1. Limiting the duration of exposure by reducing the amount of time in the hazardous area
2. Delaying entry time until radiation decays enough to permit safe passage or occupancy or both
3. Avoiding and bypassing contaminated areas

3.18.4 First Aid Treatment

The casualty-producing effects of a nuclear explosion are blast, heat, and nuclear radiation. First aid measures are limited to those for burns caused by thermal radiation and injuries caused by the blast. There are no immediate lifesaving measures for the treatment of radiation sickness or blindness caused by the intense light.

When the tactical situation prohibits you from going to a decontamination station, you must remove most of the radioactive material with whatever you have on hand. If you become heavily contaminated, the following measures are recommended:

1. You must remove your outer garments. Shake them vigorously or brush them off. Be sure the clothing is held downwind. This will remove most of the radioactive material unless it is wet and muddy.
2. When it is too cold or wet to remove your outer clothing, brush or scrape them carefully.
3. The same procedure should be used to decontaminate your equipment.

3.18.5 Personnel Decontamination Station

Complete personnel decontamination is conducted at the Personnel Decontamination Station (PDS). The PDS is setup in a secure, uncontaminated area, located as far forward as the tactical situation permits. Personnel from both the decontamination and the supported unit operate the PDS under the supervision of the Chemical, Biological, and Radiological Defense Officer (CBRDO), NOBC 2765 or the Disaster Preparedness Operations and Training Specialist, NEC 9598.

3.19.0 Seabee CBR Defense Equipment

Individual CBR defense equipment consists of permeable protective clothing, protective footwear covers, protective masks, skin decontamination kits, and atropine.

3.19.1 CBR Permeable Protective Clothing

The Joint Service Lightweight Integrated Suit Technology (JSLIST), as shown in *Figure 9-4*, is a common chemical protective clothing ensemble that includes a lightweight chemical/biological protective garment, multi-purpose over boots and gloves. The JSLIST was designed to reduce heat stress, provide compatibility with all interfacing equipment, have a longer wear period, and be washable.



Figure 9-4 — JSLIST.

The JSLIST is a lightweight, two-piece suit that can be worn as an over garment or as a primary uniform over underwear. It has an integral hood, high waist trousers, adjustable suspenders, adjustable waistband and a waist length jacket.

The JSLIST is an air permeable fabric that is lighter, cooler, and provides a higher level of protection without blocking the movement of air and perspiration through the suit. The suit weighs just less than 6 pounds. It is available in 4-color woodland or a 3-color desert camouflage pattern.

The JSLIST can be worn in an uncontaminated environment for 45 days with up to six launderings or for over 120 days with no launderings. The JSLIST can be worn in a contaminated environment for 24 hours.

NOTE

Garments are good for 120 consecutive days after removal from package. Resealing in the bag provided does not stop the counter.

3.19.2 Chemical Protective Footwear Covers (Over Boots)

The Multipurpose, Lightweight Over boot (MULO) replaces the older black vinyl over boot/ green vinyl over boot (BVO/GVO). The MULO is made by injection molding an elastomer blend, compounded to provide the characteristic chemical and environmental protection required. It incorporates two quick-release side buckles and is designed to be worn over the standard issue combat boot, jungle boot, and intermediate cold/wet boot. The MULO provides 60 days of durability and 24 hours of protection against liquid chemical agents. The MULO is capable of being decontaminated to an operationally safe level using standard field decontaminates. Environmental protection is provided against water, snow, and mud, in addition to Petroleum, Oil, and Lubricant (POL). The MULO is also flame resistant.

3.19.3 The M40 Chemical Field Protective Masks

These masks—when properly fitted and worn with the hood—will provide protection against field concentrations of all known enemy chemical agents in vapor or aerosol form. They do so by filtering contaminated air to remove the agents—not by producing oxygen. When the air has low oxygen content or when individuals are in tunnels or caves with a heavy concentration of aerosolized particles, such as burning smoke mixtures, the protective mask does not provide breathable air. These masks also do not protect against ammonia vapors or carbon monoxide.



Figure 9-5 — M40 chemical field protective mask.

The M40 mask (*Figure 9-5*) is the standard field protective mask. Masks are shipped from the manufacturer with the following components:

1. Face-piece Assembly – foundation of the protective mask. Everything else is attached to it. The face-piece fits closely against your face to form a seal. It is made of silicone rubber. Visually inspect interior and exterior surfaces of face-piece for dirt, mud, and greasy or oily substances. Check face-piece for holes, tears, and splits by holding it in front of a light source. Look closely at edges of face-piece. Check for soft or sticky spots. Check silicone rubber next to eye lenses to be sure they will not pull away from the face-piece. Also check all face-piece housings to be sure silicone is not pulling away.

2. Head Harness – these adjustable straps are attached to the face-piece. When adjusted properly, they will secure the face-piece to your face creating an airtight seal. It consists of a head pad; forehead straps, temple straps, cheek straps, and donning tab. Check the head harness for loss of elasticity and dirt. Check straps for cuts, tears, missing parts, or deterioration such as mildewing or fraying. Look at the buckles for bends, cracks, or corrosion. Check for missing or broken buckles. Make sure finish on buckles is not chipped or scratched exposing bare metal.
3. Eye-lenses, Eye-rings and Out-serts – made of clear plastic or ballistic glass and enable you to see clearly while wearing the mask. Check eye-lenses for cracks, scratches, or discoloration that affect vision. Check eye-rings for distortion or corrosion. Clear and neutral gray eye lenses out-serts are provided with the mask. The purpose of the out-sert is to protect the eye-lens from damage and to reduce fogging in cold weather. Neutral gray out-serts reduce glare. There are separate out-serts for left and right eye-lenses. To install the out-sert, fold back the rubber apron, place it over the eye-lens, and fold the apron back into place. Check both sets of out-serts for cracks, chips, or discoloration that affect your vision. Check rubber aprons for tears, looseness, brittle spots, soft or sticky spots, or cracked rims.
4. Canister – filters chemical and biological agents and other particles from contaminated air. It can be quickly and easily replaced and may be installed on either side of the face-piece to allow use by left-handed or right-handed shooters. Do not allow the inside of the canister to become wet. A wet canister is useless. Check the canister, especially around the seams, for cracks, dents, holes, and damaged threads. Ensure the air intake is not clogged with dirt. Shake the canister and listen for any signs of loose absorbent particles. The canister is installed into the side port of the face-piece, over the inlet valve. Tighten the canister hand tight by turning clockwise.
5. Outlet Valve Disk and Outlet Valve Cover – releases exhaled air and prevents unfiltered air from entering the face-piece. Do not use the mask if the outlet valve disk is missing or damaged because the face-piece will leak. The outlet valve cover protects the outlet valve disk and secures the external drinking tube. To check the outlet valve disk, grasp the tab on the bottom of the outlet valve cover and lift. Check to see if the outlet valve disk is present and is not curled or distorted. Place your thumb on the disk and rotate it to make sure it is not sticking. Do not remove the outlet valve disk from the outlet valve. Look at the disk for nicks, tears, or rips. Wipe off any moisture with a clean cloth. Check the outlet valve seat for dirt. Smooth the outlet valve disk so it lies flat on the outlet valve seat. Check the outlet valve cover for cuts, tears, or holes. Look at the inside of the outlet valve cover for dirt or moisture.
6. Internal/External Drink Tubes – the M40 Field Protective Mask is equipped with a system which allows the wearer to drink while wearing the face-piece. The internal tube is grasped by the person's mouth. The external tube has a quick disconnect coupling which connects the face-piece to the NBC Canteen Cap. Check that both tubes are present and are free of cracks or cuts. Ensure the internal drink tube has proper alignment and the external drink tube has solid connections. Connect the coupling to the canteen cap and blow air through the system to ensure it is not clogged.

7. Airflow Deflector – located on the inside of the face-piece below either the left or right eye-lens depending on the canister location. It directs inhaled air over the eye-lenses to prevent fogging. Check that the airflow deflector is securely mounted inside the face-piece and that both flanges are in the mounting holes of the face-piece and are not broken. Check the mounting holes for cuts or tears.
8. Inlet Valve Disk – allows filtered air to enter the face-piece and prevents moist exhaled air from entering the canister. Do not use the mask if the valve body or inlet valve disk is missing. Check that the inlet valve disk and valve body are properly mounted on the airflow deflector post. Blow on the disk to make sure it is not stuck to the valve body. Ensure the disk is free of cuts, holes, tears, or dirt.
9. Nose-cup Assembly – inside the face-piece is the nose-cup. It has one nose-cup valve disk on each side. The nose-cup allows filtered air to pass through the nose-cup valve disks and into your respiratory system from the upper part of the face-piece and directs exhaled air out through the outlet valve in the bottom of the face-piece. This ensures good airflow, which prevents moist exhaled air from fogging the eye-lenses in cold weather. Check that the nose-cup and nose-cup valve seats are free of dirt, cracks, cuts, holes, or tears. Check that the nose-cup is securely attached to the back of the face-piece by gently pulling it away. Rotate the nose-cup valve disks to be sure they are not stuck and check them for curling or tears. Smooth the nose-cup valve disks over the nose-cup valves.
10. Voicemitter – the face-piece is equipped with a front voicemitter, which transmits the user's voice outside the face-piece, and a side voicemitter, located opposite the inlet valve, which aids in the use of communications equipment. Check the retaining rings around both for corrosion, cracks, or nicks. Try to tighten the retaining rings by hand to check for looseness. Ensure both voicemitters are free of dents, cracks, punctures, or dirt and that the four beads in the center of each voicemitter are facing outward.
11. Carrier – provides for storage, protection, and carrying of the mask and additionally authorized items. Check carrier for dirt, sharp edges, torn straps, broken stitches on seams, or missing hardware. Make sure there are no pencil or pen markings on the carrier. Mildew, solvents, or abrasive materials on carrier may harm the face-piece. Check the hook and look fastener for dirt or debris. Check metal hooks and D-rings for bends or breaks that make them unusable.
12. Waterproof Bag – keeps the mask dry when required by climate or mission. It includes rubber bands for sealing and instructions for use. Storage of the mask in waterproof bag can degrade the protective capabilities of the face-piece. You must remove the face-piece as soon as protection of the mask is no longer required. Check the waterproof bag for cracks, tears, holes, and brittleness. Food should not come in contact with the waterproof bag because of possible toxic effects. It is stowed in the left end pocket of the carrier.

The following are accessories of the M40 FPM:

1. M1 Canteen Cap – contains a hole that allows the external drinking tube to be connected to the canteen. Always check that the surfaces are free of contamination before connecting the drinking system.
2. Decontaminating Kit – used for personal decontamination.
3. Optical Inserts – available by medical prescription for personnel who must wear glasses. Do not wear eyeglasses or contact lenses with your mask. Check your

inserts for broken lenses, broken frame, loose screws, or becoming disconnected from the face-piece.

3.19.4 Skin Decontamination Kit

The M291 kit consists of a wallet-like carrying pouch containing six individual decontamination packets—enough to do three complete skin decontaminations. The kit allows personnel to decontaminate their skin through physical removal, absorption, or neutralization of toxic agents with no long-term harmful effects. The kit is used for external use only and may be slightly irritating to eyes or skin. Personnel must ensure that they keep the decontamination powder out of eyes, cuts, or wounds and avoid inhalation of the powder.

3.19.5 Individual Equipment Decontamination Kit

The M295 kit allows personnel to decontaminate their individual equipment through physical removal and sorption of chemical agents. The kit can decontaminate approximately 1,200 square feet. Decontamination is accomplished through sorption of contamination by both the kit nonwoven polyester pad and by the decontaminating powder. It is not approved for skin decontamination. Decontaminating the CB protective mask/hood, gloves, footwear, weapon, helmet, and Load-Bearing Equipment (LBE) preclude agent transfer during the overgarment exchange and entry or exit procedures.

3.19.6 Nerve Agent Antidode Kit (NAAK), Mark I

Three NAAK, Mark I, injectors are carried by the individual in the top outside pocket of the mask carrier. These injectors are used for nerve agent first aid. This solution has a relatively high freezing point and should be removed from the carrier and placed inside the field uniform in cold weather (below 45°F).

There is also one more auto injector located with the NAAK; it is the CANA auto injector. This auto injector contains 10mg of diazepam. It is given after the third dose of the NAAK. It has the same characteristics as the NAAK, Mark I.

4.0.0 CBR UNIT EQUIPMENT

Each Seabee unit should have the equipment discussed below.

4.1.0 M4 Joint Chemical Agent Detector (JCAD)

The M4 Joint Chemical Agent Detector (JCAD) (*Figure 9-6*) is a portable, battery operated point sampling detector that continuously samples the air for gases and vapors. This unit is the primary means of detecting chemical agents arriving in a unit area from an upwind chemical attack. It can detect



Figure 9-6 — M4 Joint Chemical Agent Detector (JCAD).

chemical agents in vapor and aerosol form and can alert personnel by audible and visual signals. It is issued to platoons, companies, and similar units. The detector unit detects and identifies Chemical Warfare Agents (CWAs) or Toxic Industrial Chemicals (TICs) and issues visual and audible alarms in the event of a detection. Visual displays provide the class and concentration of the hazard detected.

Capabilities and features:

- Lightweight, hand portable design
- Three user-selectable operating modes
  1. CWA 5-Second Mode (default)
  2. CWA 1-Second Mode
  3. TIC Mode
- Powered by four 1.5V AA-size batteries
- Two audible indications:
  1. Alarm for agent detection
  2. Alert for equipment status faults (i.e., low battery)
- Earpiece for use in tactical situations
- Detection cycle designed to conserve battery life
- Can be operated in Personnel Protective Equipment (PPE)

After a positive detection, the detector issues visual and audible alarms. The Light Emmiting Diodes (LEDs) on the front display of the detector show the class and concentration of the CWA detected.

The JCAD can be set up in a remote location and wired to an M42 remote alarm. The M42 remote alarm unit provides both an audible and visual alarm when connected by wire to the JCAD.

The M42 audible alarm can be turned off manually. Up to five M42s can be connected to the JCAD (*Figure 9-7*). Maximum cable length must not exceed 400 meters from the detector to the farthest alarm.

Figure 9-8, frame 1, shows a situation where four detectors are emplaced with three platoons online. Note the orientation on the wind direction. The detector is oriented on wind direction, not on the direction of the enemy. When the automatic chemical agent alarms are mounted on vehicles, consideration must be given to wind direction for the protection of the main body.



Figure 9-7 — M42 with JCAD.

Figure 9-8, frame 2, shows an array using four detectors with the wind direction coming from the right flank of the unit. A significant difference between a four-detector and a six-detector array is that with only four detectors they must be shifted when the wind direction shifts greater than 20 degrees.

Figure 9-8, frame 3, shows a company in a defensive position with six detectors deployed. The actual number of alarm systems per unit varies depending upon the Table of Allowance (TOA). The 400-meter distance between the M4 JCAD detectors reduces the possibility that agent clouds might drift through holes in the array. This array provides a high probability of detecting an off-target attack within a reasonable warning time.

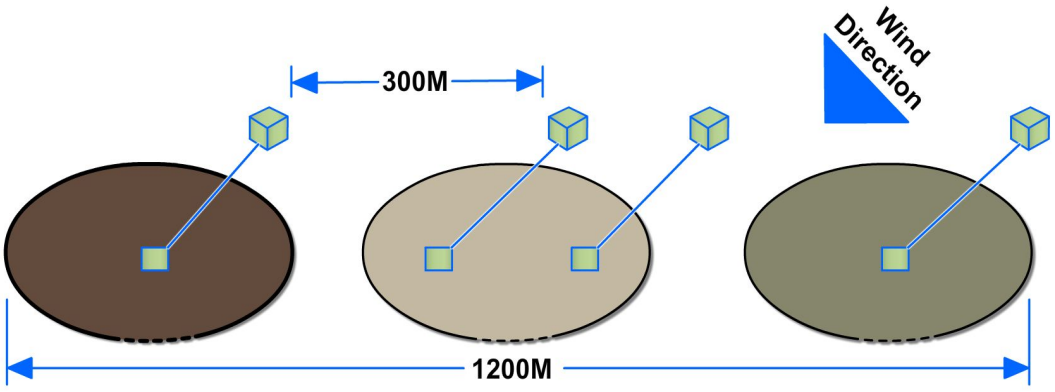


Figure 9-8 — Deployment of the automatic chemical agent alarms.

NOTE

Remember that the detector is oriented on wind direction, **NOT** on the direction of the enemy.

4.2.0 IM-270/PD Dosimeter



Figure 9-9 — IM-270/PD.

The IM-270/PD (*Figure 9-9*) is an electronic dosimeter designed for use during a nuclear event. It provides real time measurement and indication of personnel dose and does not require a separate reader to evaluate the dose. It measures radiation dose from exposure to x-rays and gamma rays both pulsed and continuous. The total dose is instantly displayed on a Liquid Crystal Display (LCD) screen. The dynamic range of the dosimeter is from 10-1000 rads in 1 rad increments. Any dose less than 10 rads is displayed as zero. The dosimeter is designed in a wrist watch style and is worn on the wrist or forearm. It has a hook and loop type fastener wristband of

Interaction Available

adjustable length to accommodate different wrist sizes (with over garments) from a minimum of 8.5 inches to a maximum of 14 inches. It contains a battery with an expected life of 10 years. No preventive maintenance is required.

4.3.0 AN/PDQ-1 Radioactive Detection Identification and Computation (RADIAC) Set

These are hand-held electronic monitoring devices containing an internal gamma detector, and an interface to a family of radiation measurement probes for alpha, beta, gamma, neutron, and x-ray. The measurement is displayed on an LCD screen for visual monitoring. The multi-function RADIAC has been designed to replace the existing RADIACs in use today.

The AN/PDQ-1 has a Built in Test (BIT) function that verifies the equipment is in operating standards within all modes of operation. The single line LCD screen displays either the interior detector reading or the external probe reading, when attached. It also provides information on battery condition, alarm thresholds, audio and alarm status, BIT status, and probe type. The device uses two “D” cell batteries that provide 200 hours of operation without the use of a probe and only 100 hours of operation with a probe installed.

4.4.0 M100 Sorbent Decontamination System (SDS)

The M100 Sorbent Decontamination System (SDS) (*Figure 9-10*) is intended for operator wipe down on vehicles utilized by the Naval Construction Force (NCF). The wipe down should be performed within 15 minutes of exposure. Operators use the M100 to decontaminate the surfaces they need to touch or contact to operate the equipment. Radiological contamination in the form of dust particles may be wiped, scraped, or brushed off. The M100 contains two packs of reactive sorbent powder, two wash mitt-type sorbent applicators, a case, two straps and detailed instructions. It allows two operators to perform simultaneous decontamination operations. The use of the M100 SDS decreases decontamination time and eliminates the need for water.



Figure 9-10 — M100 sorbent decontamination system.

4.5.0 Mission Oriented Protective Posture (MOPP)

MOPP is a flexible system of protection against chemical agents, used to facilitate mission accomplishment in chemical warfare. MOPP requires the individual to wear protective equipment consistent with the chemical threat, the work rate imposed by the mission, and the temperature. (See *Table 9-1* for MOPP levels.)

Table 9-1— MOPP levels.

MOPP Level	Description
0	Carry mask and ensure that Individual Protective Equipment (IPE) is available
1	Don over garment
2	Don protective boots
3	Don protective mask
4	Don protective gloves

All combat operations are conducted under the MOPP system. Of course, when there is no threat, there is no protection requirement, but this is still a MOPP. At the other extreme, when there is a continuing, immediate threat of chemical attack and the enemy has the capability to produce an unacceptable casualty level among unprotected troops, the troops may be required to wear protective clothing and equipment for extended periods. In this case, some form of safe area must be provided so troops can perform the necessary functions that require removal of some or all of the protective gear.

4.6.0 MOPP Flexibility-Limiting Factors

The flexibility of MOPP in providing individual protection is limited by the temperature of the surrounding area, fatigue level of the troops, the degree to which the troops need to use their senses, and personal needs.

4.6.1 Heat Exhaustion

Individuals operating a moderate-to-heavy work rate while in chemical protective gear may experience heat exhaustion (dizziness and fainting) at any time, especially during periods of high temperature.

4.6.2 Fatigue

Individuals in full chemical protective clothing and equipment tend to experience fatigue resulting from such factors as mask breathing resistance, increase in body temperature from work energy and solar heat, and psychological and physiological stress. This condition of fatigue increases the need for rest and sleep to maintain individual alertness and efficiency.

4.6.3 Senses

Individuals required to perform duties involving their senses or related functions, such as manual dexterity, visual activity, and voicing communication, operate at varying levels of efficiency, depending on training and proficiency while in full protective gear.

4.6.4 Personal Needs

Individuals cannot be in full chemical protection for indefinite periods and still attend to certain personal needs, such as eating, caring for wounds, shaving, and eliminating of bodily wastes.

5.0.0 MARKING OF CONTAMINATED AREAS

The markers *(Figure 9-11)*, or signs, are used in areas containing radiological, biological, and chemical contamination. The base of the triangle should be about 11 inches (28 cm) and the opposite sides about 8 inches (20 cm). The signs are in the shape of a right isosceles triangle (90 degrees by 45 degrees by 45 degrees) and are made of soft plastic with “ears” that are used for hanging them above the ground. They are placed on wire boundary fences, poles, trees, or rocks.

5.1.0 Chemical Contamination Markers

The chemical contamination marker (*Figure 9-11, frame 1*) is a triangle that is yellow on both sides. The word “GAS” in red 2-inch (5 cm) block letters is placed on the side of the markers facing away from the contamination (front). Fluorescent paint is used, when available. The name of the agent, if known, and the date and time of detection are also placed on the front of the marker at the time of emplacement with paint, marking pencil, or grease pencil.

5.2.0 Biological Contamination Markers

The biological contamination marker (*Figure 9-11, frame 2*) is a triangle that is blue on both sides. The letters “BIO” in red (fluorescent paint, if available) 2-inch (5 cm) block letters are placed on the side of the marker facing away from the contamination (front). The name of the agent, if known, and the date and time of detection are also placed on the front of the marker at the time of emplacement.

5.3.0 Radiological Contamination Markers

The radiological contamination marker (*Figure 9-11, frame 3*) is a triangle that is white on both sides. The word “ATOM” in black 2-inch (5 cm) block letters is placed on the side of the markers facing away from the contamination (front). The dose rate, date, and time of reading, and the date and time of burst, if known, are also placed on the front of the marker at the time of emplacement.

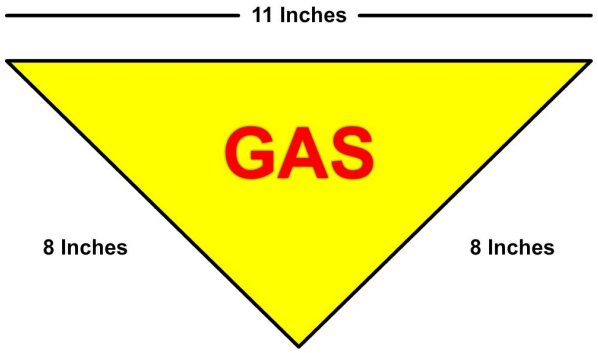


Figure 9-11 — Chemical markers.

Interaction Available

5.4.0 Chemical Minefield Markers

To properly mark a chemical minefield (*Figure 9-11, frame 4*), use the chemical markers and attach them to guy wires surrounding the entire area at risk. The chemical agent in the mines and the date of emplacement may also be inscribed on the front of the marker if desired by the commander.

Summary

In this chapter, you were introduced to chemical, biological and radiological weapons. You learned about the effects, symptoms defense, and decontamination of each type. You learned about the different types of equipment utilized to detect and decontaminate after being exposed to the agents. You learned the different MOPP levels and how to properly wear the JSLIST. Finally you learned about how to properly mark the contaminated area.

Assignment 9

Objectives

1. Describe the effects of Chemical, Biological, Radiological, and Nuclear (CBR-N) weapons.
2. Recognize the symptoms and effects of CBR-N agents.
3. Recognize Seabee CBR defense responsibilities.
4. Recognize and describe Seabee CBR defensive equipment.
5. Describe the MOPP and its limitations.
6. Recognize the markers used in CBR contaminated areas.

Questions

1. Chemical agents can be used to produce what type of incapacitation?

    1. Temporary
    2. Permanent
    3. Local
    4. Centralized

2. What chemical agent is the most effective and lethal?

    1. Blood
    2. Choking
    3. Blister
    4. Nerve

3. What type of chemical agent interferes with mental processes that control body functions?

    1. Harassing
    2. Cumulative nerve
    3. Nonlethal incapacitating
    4. Nontoxic blister

4. What method of transmission is the most efficient for delivering biological agents?

    1. Contamination
    2. Animals
    3. Insects
    4. Aerosols

5. The effects of a nuclear explosion are divided into what categories?

    1. Direct, indirect, and heat
    2. Blast, heat, and nuclear radiation
    3. Primary and secondary
    4. Primary radiation and nuclear radiation

6. Secondary blast injuries from nuclear weapons can be caused by which of the following forces?

    1. Flying debris
    2. Blinding light
    3. Air shock wave
    4. Blast wave

7. Permanent damage to your eyes can occur from thermal radiation at a distance of how many miles from a large-yield nuclear weapon?

    1. 10 to 20
    2. 20 to 30
    3. 30 to 40
    4. 40 or more

8. What type of nuclear radiation has little penetrating power?

    1. Alpha
    2. Beta
    3. Neutron
    4. Gamma

9. What method provides protection of internal contamination from radiation?

    1. Use a concrete bunker
    2. Wear battle dress
    3. Wear a protective mask
    4. Use a handkerchief

10. What symptoms indicate that you have been exposed to a nerve agent?

    1. Irritation to the throat
    2. Tightness of the chest
    3. The eyes feel gritty
    4. Intense itching

11. What areas of the body are most sensitive to burns from mustard vapor?

    1. Moist
    2. Ear
    3. Scalp
    4. Exposed skin only

12. The severity of the symptoms produced by blood agents depend on what factors?

    1. Concentration and Development of the agent
    2. Duration and Condition of exposure
    3. Concentration of the agent and duration of exposure
    4. Time and duration of exposure to agent

13. Exposure to what agent causes Pepper like burning of the eyes, nose, and air passages, followed by flow of tears and repeated coughing and sneezing?

    1. Blister
    2. Choking
    3. Vomiting
    4. Blood

14. Exposure to what agent will cause your eyes to water, feel gritty, become sore and bloodshot; eyelids become red and swollen?

    1. Blister
    2. Choking
    3. Vomiting
    4. Blood

15. Exposure to what agent will cause dryness of the throat, coughing, choking, tightness across the chest, nausea, and smarting and watering of the eyes

    1. Blister
    2. Choking
    3. Vomiting
    4. Blood

16. The tear agent CS causes incapacitation within how many seconds?

    1. 1 to 2
    2. 3 to 8
    3. 10 to 20
    4. 20 to 60

17. A CBR victim that appears drunk is suffering from what type of agent?

    1. Choking
    2. Nerve
    3. Incapacitating
    4. Vomiting

18. The planning of the overall CBR defensive measures for an encampment is the responsibility of what individual?

    1. Chief of staff
    2. Security officer
    3. Battalion commander
    4. Operations officer

19. What measure is considered the best defense against a chemical attack?

    1. Protective equipment maintenance
    2. CBR training
    3. Decontamination of personnel and equipment
    4. Constant monitoring with detection equipment

20. When should you cross contaminated terrain?

    1. During the hottest part of the day
    2. Approximately 24 hours after the initial attack
    3. Only when absolutely necessary
    4. After rainfall

21. MOPP stands for what CBR defense term?

    1. Mission, orientation, planning, and preparation
    2. Mission-oriented protective posture
    3. Military operation protective plan
    4. Mobile-oriented protective posture

22. When the M9 chemical agent detector paper turns red, it is indicating the presence of what type of agent?

    1. Liquid nerve
    2. Vapor nerve
    3. Liquid blood
    4. Vapor blood

23. To what part of the body should you attach the self-adhesive M9 paper?

    1. Upper part of the left arm
    2. Upper part of the right arm
    3. Lower part of the left leg
    4. Lower part of the right leg

24. You are the first person to learn of a chemical attack. You immediately stop breathing. What action should you take next?

    1. Sound the alarm
    2. Assist stricken buddies
    3. Don your protective mask
    4. Wait for instructions from your squad leader

25. **(True/False)** After a chemical agent attack, you should not unmask until authorized by your immediate commander.

    1. True
    2. False

26. To neutralize or remove chemical contamination from exposed skin, you should use what kit?

    1. M251
    2. M295
    3. M258
    4. M291

27. If you develop the symptoms of nerve-agent poisoning, what medication, if any, should you use?

    1. Amyl-nitrite Mod 1
    2. Morphine
    3. Atropine Nerve Agent Antidote Kit (NAAK), Mark I
    4. None

28. A Seabee may use a maximum of how many NAAK injectors without authorization from medical personnel?

    1. One
    2. Two
    3. Three
    4. Four

29. After taking atropine to overcome the effects of a nerve agent, what symptom is a good sign of recovery?

    1. Dryness of the mouth
    2. Appetite returns
    3. Limber arms and legs
    4. Double vision clears up

30. When an enemy aircraft flies low over your area and produces a mist, more than likely this is an indication of what type of warfare?

    1. Biological
    2. Chemical
    3. Radiological
    4. Organic

31. What is the best defense before a nuclear attack?

    1. Get inside a building
    2. Wear full clothing
    3. Dig in
    4. Don your mask

32. What is the first indication of a nuclear attack?

1. Loud noise
2. Intense light
3. Intense heat
4. Shock wave

33. The two-piece permeable protective clothing may be worn for a maximum of how many days?

1. 45
2. 60
3. 110
4. 120

34. The CBR field protective mask does **NOT** protect you from which of the following agents?

1. Mustard gas
2. G-vapors
3. Carbon monoxide
4. Hydrogen cyanide

35. The filter on the M40 mask must be replaced under what circumstance?

1. Every 20 days of prolonged use
2. When directed by your squad leader
3. Only after immersion in water
4. When the lot number series is expired

36. The automatic chemical agent alarm alerts personnel in what manner?

1. An audio signal only
2. Changing colors of its chromate paper
3. Both audio and visual signals
4. A digital readout of the air content

37. What standard tactical dosimeter is used by the Seabees?

1. IM-174/PD
2. CD-316/PD
3. IM-270/PD
4. AN126/PD

38. **(True/False)** Combat operations are conducted under the MOPP system except when there is no CBR threat.

1. True
2. False

39. What CBR hazard is indicated by the use of a blue triangle with red letters on the side facing away from the contamination?

    1. Gas
    2. Biological
    3. Radiological
    4. Chemical minefield

40. What CBR hazard is indicated by the use of a white triangle with black letters?

    1. Gas
    2. Biological
    3. Radiological
    4. Chemical minefield

41. What CBR hazard i is indicated by the use of a yellow triangle with red letters?

    1. Gas
    2. Biological
    3. Radiological
    4. Chemical minefield

42. What CBR hazard is indicated by the use of A red triangle with yellow letters?

    1. Gas
    2. Biological
    3. Radiological
    4. Chemical minefield

Assignment 9

Chemical, Biological, and Radiological (CBR) Defense

Directions: Select the correct answer from the list of alternates below each question in the end of chapter assignment. Write in the answer next to the corresponding question number below. Use this answer sheet as a reference to completing the online assignment related to this assignment.

1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	
12.	
13.	
14.	

15.	
16.	
17.	
18.	
19.	
20.	
21.	
22.	
23.	
24.	
25.	
26.	
27.	
28.	

29.	
30.	
31.	
32.	
33.	
34.	
35.	
36.	
37.	
38.	
39.	
40.	
41.	
42.	

Additional Resources and References

This chapter is intended to present thorough resources for task training. The following reference works are suggested for further study. This is optional material for continued education rather than for task training.

NTTP 3-11.26, Multiservice Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Decontamination

NTTP 3-11.27, Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical (NCB) Protection

NTTP 3-11.25, Multiservice Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Contamination Avoidance

NTTP 3-11.29, Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical Reconnaissance

TM 3-4230-236-10, Operator's Manual for Decontamination System, Sorbent: M100

TM 3-6665-311-10, Operator's Manual for Paper, Chemical Agent Detector: M9

TM EE700-AD-MMO-010, Operation Instructions Organization Maintenance, Radiac Sets AN/PDQ-1 and AN/PDQ-2

TM SE700-AL-OMA-010, Operations Manual for Self Indicating Casualty Dosimeter: IM-270/PD

TM 3-4240-346-10, Operator's Manual for Chemical-Biological Mask: Field, M40A1

TM SS200-AP-MMO-010, Operator's Manual for Joint Service Lightweight Integrated Suit Technology (JSLIST) Chemical Protective Ensemble

TM NAVSEA S9437-B2-OPI-010, Operator's Manual for Detector, Chemical Agent, Automatic: JCAD, M4

Trainee Feedback

Center for Seabees and Facilities Engineering (CSFE) makes every effort to keep their courses up-to-date and free of technical errors. If you have a suggestion, found an error or inaccuracy, please write, FAX or email us by using the form below. Use one form for each comment and be sure to fill in the information as accurately and detailed as possible. Thank you for your assistance.

Write: CSFE
NCF Training Division (N7B)
3502 Goodspeed St.
Port Hueneme, CA 93043-4337

FAX: (805) 982-5508 / DSN 551-5508

E-mail: CSFE_CBCH@navy.mil

Trainee Feedback Form

Course: Seabee Combat Handbook, Volume ____, NAVEDTRA: _____

Course Date: _____ Chapter Number: _____ Page: _____

Paragraph: _____ Sentence: _____ Figure: _____ Frame/View: _____

Description: _____
_____
_____
_____
_____
_____

(optional) Corrective action: _____
_____
_____

(optional) Supporting reference(s): _____
_____

Your email address, if a response is requested: _____

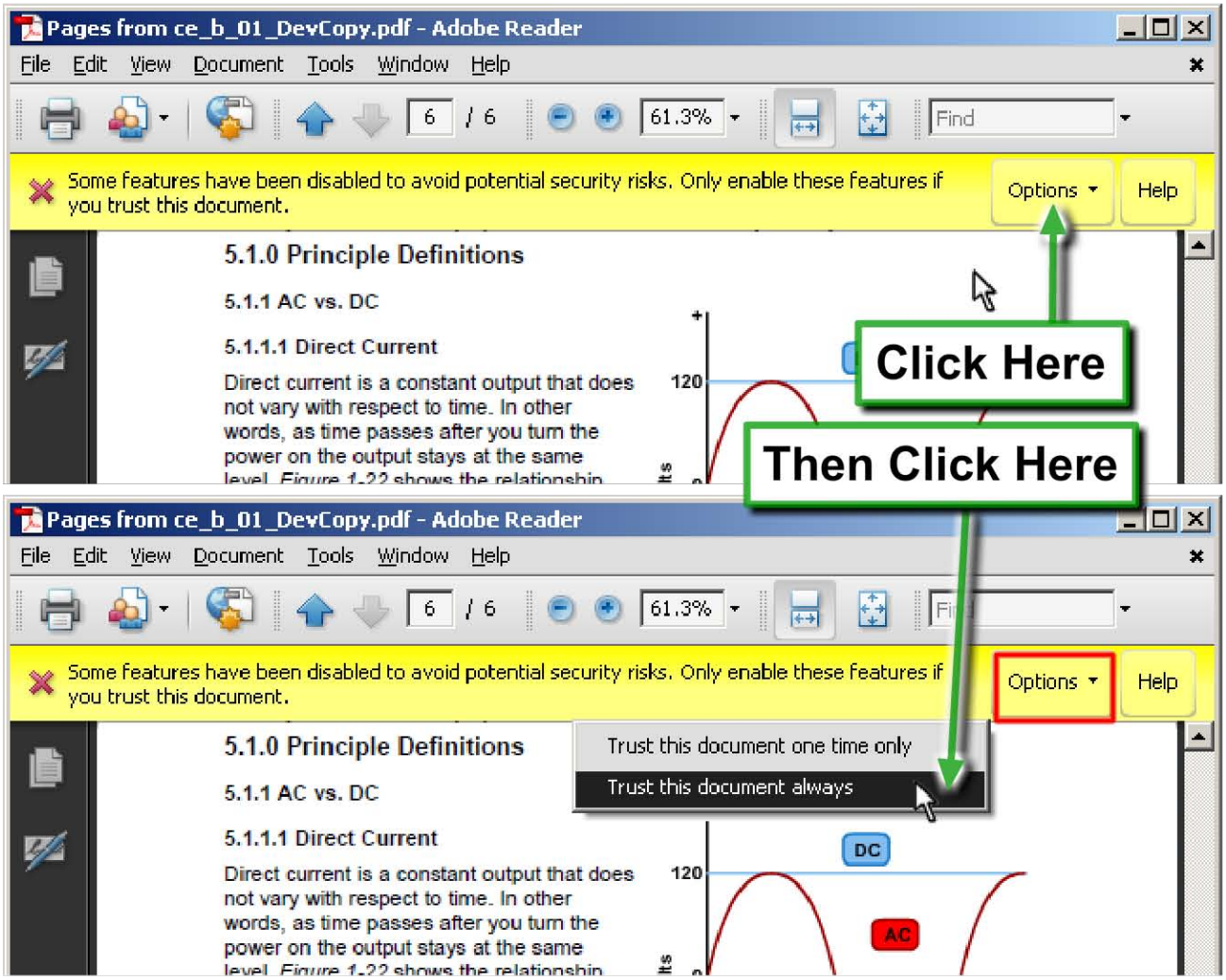
The Interactive features of this manual are currently disabled.

Many graphics will not appear correctly unless these features are turned on. You should either see a popup window, or a yellow banner at the top of the application. To enable the Interactive features of this manual follow the steps illustrated below:

If you see a popup window do the following:



If you see a yellow banner, do the following:



Once you have completed either of the above procedures the features will be enabled for this document, and this warning won't appear again after you leave this page.

Chapter 10

First Aid and Field Sanitation

1.0.0 Basic First Aid

2.0.0 First Aid Measures

3.0.0 Heat and Cold Injuries

4.0.0 Field Sanitation

5.0.0 Water Purification

To hear audio, click on the icon: 

Overview

This chapter will help you understand the importance of first aid to an injured person and will provide you with an explanation of the first aid measures that you can apply to yourself and to others before trained medical personnel arrive. How-to instructions in lifesaving measures are provided for clearing the upper airway, giving artificial ventilation, stopping bleeding, controlling shock, and protecting the wound. In addition, the fundamentals of field sanitation and water purification are presented.

Objectives

When you have completed this chapter, you will be able to:

1. Define first aid and identify the general first aid rules.
2. Define basic life support.
3. Recognize the signs of airway obstruction and describe the steps necessary to clear the airway.
4. Recognize and describe the steps necessary to perform artificial ventilation.
5. Describe the methods used to control bleeding.
6. Define shock and identify its signs, symptoms, and treatment.
7. Identify the cause and treatment of injuries caused by exposure to heat or cold.
8. Identify the treatment of first aid to victims of various types of burns.
9. Recognize the steps in treating and immobilizing a fracture.
10. Identify field sanitation methods used to dispose of human waste and garbage.
11. Identify the procedures taken to purify drinking water.

Prerequisites

There are no prerequisites for completing this manual.

Features of This Manual

This manual has several features which make it easy to use online.

- Figure and table numbers are italicized within the handbook text. Figure and table reference numbers are conveniently located next to (or near) the applicable handbook text.
- Audio and video clips are included in the text, with italicized instructions telling you where to click to activate the appropriate link.
- Review questions are included at the end of this chapter as the chapter assignment. To submit assignments log into https://www.courses.netc.navy.mil, go to “Student Services”, in the drop down click on “Active Courses”, go to "View/Submit Answers" next to the course you wish to submit answers for. Assignments may be submitted to the above Web site as they are completed, and instant scoring is available. Your completion letter is available as soon as you pass all assignments.
- A form at the end of each chapter allows your input for improving the manual or correcting errors to be brought to the attention of CSFE’s Technical Review Committee. Your input is important and will help keep this manual up to date and free of technical errors.

1.0.0 BASIC FIRST AID

First aid is the emergency care given to the sick, injured, or wounded before and until they can be treated by medical personnel.

There are some fundamental concepts to keep in mind as you learn basic first aid techniques. First of all, you need to realize that first aid knowledge and skills can and do save lives. You can save a casualty’s life and prevent permanent disability if you know **what to do**, **what not to do**, and **when to seek trained medical assistance**. The three basic reasons for first aid are to save lives, prevent further injuries, and prevent infection.

Most injured or ill service members are able to return to their units to fight or support primarily because they are given appropriate and timely first aid followed by the best medical care possible. How you attend to sick or injured fellow Seabees may be the difference between life and death.

Before you learn the specific treatments for various types of injuries, you should have an understanding of the following general rules of administering first aid:

- Continuity - First and foremost, as a non-medical person, you should seek medical assistance as soon as possible, but not interrupt your first aid efforts. When available, you should send a fellow Seabee for help. After administering any necessary first aid treatment, you should continue to monitor the casualty for the development of any conditions which may require further treatment or lifesaving measures, until relieved by properly trained medical personnel.

- Attitude - You should remain calm and act quickly, but efficiently. Reassure the casualty that his or her injuries are understood and that proper medical attention is forthcoming. The casualty's confidence and positive attitude can be very helpful.
- Positioning the Casualty - In most cases, the casualty should be lying down with his or her head level with the body until you have determined the type and extent of his or her injuries. The exceptions to this are the following:
    - If the casualty is in danger of choking on blood or vomited matter, place the casualty on his or her side, or on the back with the head turned to one side and lower than the feet.
    - When the casualty has a chest injury or difficulty breathing, place him or her in a sitting or semi-sitting position.
    - If the casualty is in shock, place him or her on the back with the head slightly lower than the feet. When injuries allow, raise and support the casualty's feet approximately 6 to 12 inches off the ground.

NOTE

If a bone is broken, or you suspect one is broken, do not move the casualty until you have immobilized the break. An exception to this rule is when the casualty is in danger from fire, flood, or hostile fire.

- Clothing - Although you should move the casualty no more than necessary, you may have to remove clothing in order to determine the extent of his or her injuries. Remove only the clothing necessary for examination and treatment, being especially careful with fractures and areas where the clothing may be stuck to the wound. If necessary, clothing can be cut off or ripped along the seams. Shoes may also have to be cut off to avoid pain or complicating an injury. When removal of clothing is necessary, ensure the casualty does not become chilled.
- Infection - Do not touch any open wounds or burns with your fingers, hands, or other non-sterile objects unless absolutely necessary to stop severe bleeding.
- Food or Drink - An unconscious person should never be given food or drink. This could cause the casualty to choke from unsuccessful vomiting or even cause death.

1.1.0 Vital Functions

Before you learn how to evaluate a casualty and the various treatments, you should have a basic understanding of the body's vital functions; the breathing process, respiration, and blood circulation. As the term implies, these functions are vital to the continuance of life and therefore the most important.

1.1.1 The Breathing Process

All human beings must have oxygen to survive. Through the breathing process, your lungs draw in oxygen and put it into your blood stream (*Figure 10-1)*. Your heart then pumps this oxygen-rich blood throughout your body to supply your cells with the required oxygen. If brain cells are deprived of oxygen, they will die within 4 to 6 minutes, and will never regenerate, unlike some of the body's other cells. As brain cells die, permanent brain damage occurs, followed by paralysis, and finally death.

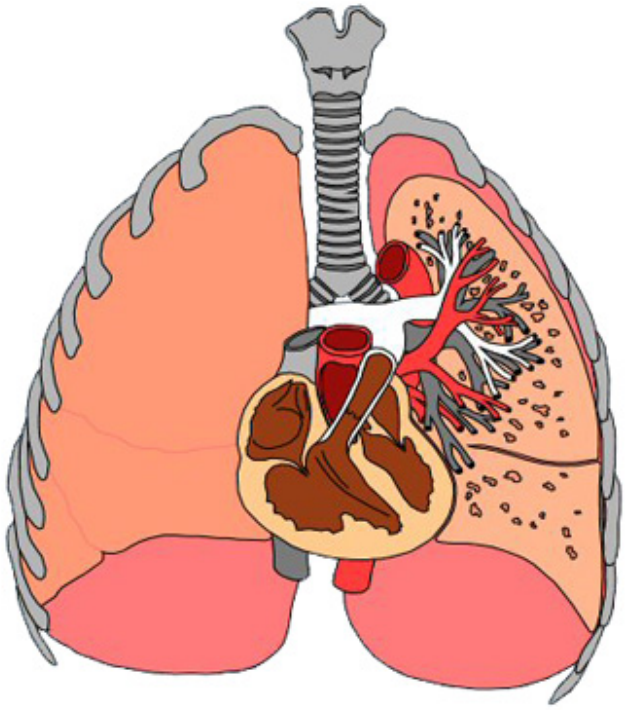


Figure 10-1 — The Breathing Process.

1.1.2 Respiration

Respiration occurs when you inhale to take in oxygen, and then exhale to expel carbon dioxide (*Figure 10-2)*. This process uses your airway, which is comprised of your nose, mouth, and throat; your lungs, including the bronchial tree; and your rib cage when your diaphragm and rib muscles contract and relax. This cycle occurs 12 to 18 times per minute, supplying oxygen-rich blood to your heart.

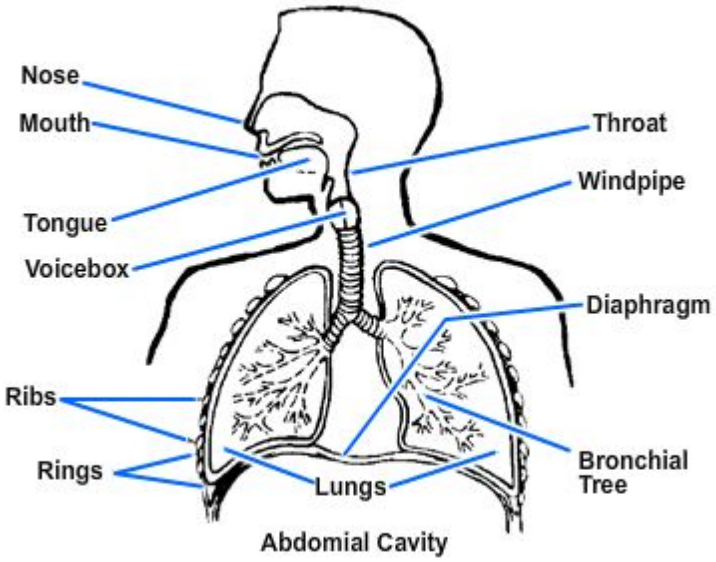


Figure 10-2 — Respiratory System.

1.1.3 Circulation

The pulse that can be felt at various points on the body is caused by the rhythmic expansion and contraction of the arteries. A casualty's pulse can be felt at the carotid artery on the side of the neck, the femoral artery in the groin area, the radial artery on each wrist, and the posterior tibial artery at each ankle. Refer to *Figure 10-3* to see each artery's location on the body.

NOTE

Do not use your thumb to check a casualty's pulse because you may confuse the beat of your own pulse with that of the casualty.

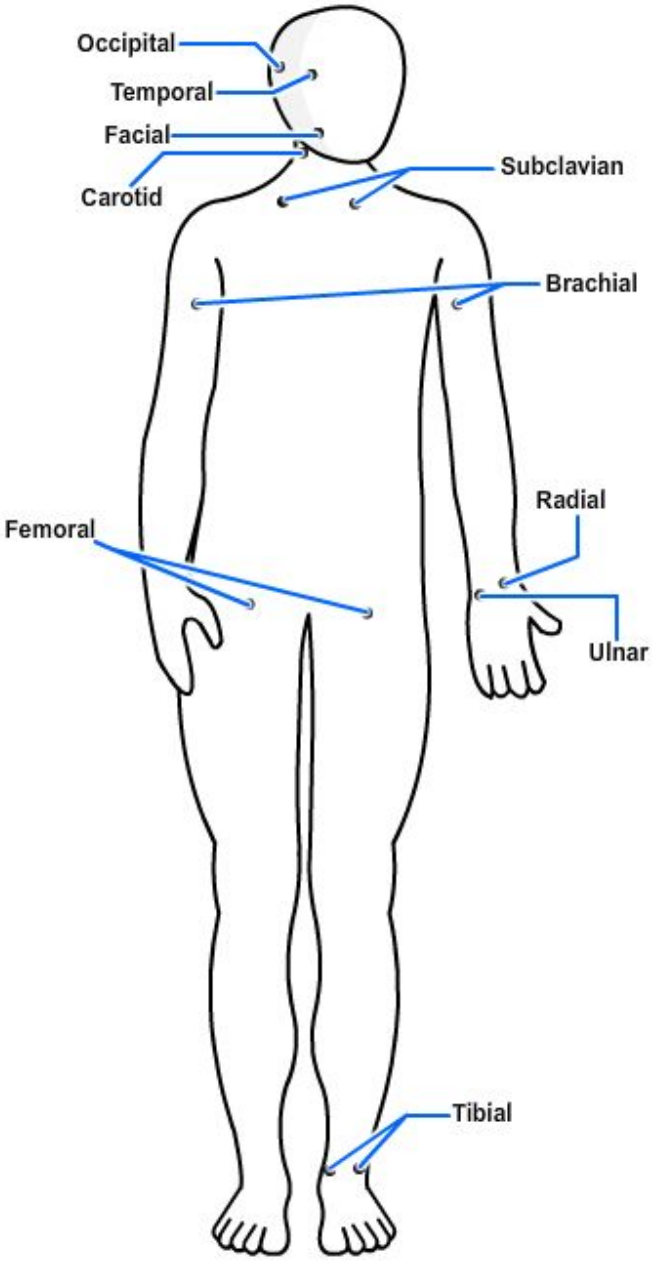


Figure 10-3 — Points on the body for detecting a pulse.

1.2.0 Evaluating a Casualty

There are eight steps in properly evaluating a casualty. They should be performed in order, and the results used to apply the proper corrective treatment or action. In most cases, the treatment indicated by each step will be explained in detail later in this chapter.

1.2.1 Step 1 – Check for Responsiveness

Step one in evaluating a casualty is to check for responsiveness. Shake the casualty gently and ask him or her if he or she is ok. If you get no response, go to Step 2. If the casualty is conscious, but choking, begin measures to open their airway as described in the next section. Ask the casualty where he or she hurts or has unusual feelings, such as numbness. Have the casualty indicate where the pain or numbness is located.

NOTE

If you suspect he or she has a broken back or neck, DO NOT shake or move the casualty unless located in an area of immediate danger.

1.2.2 Step 2 – Check for Breathing

Step two is to check for breathing. Use your senses to look for the rise and fall of their chest, listen for the sounds of breathing, and feel for breath on the side of your face. If the casualty is breathing, continue to Step 3. If not, stop and attempt to ventilate or open his or her airway. The methods for ventilation and clearing the airway are covered in detail in the following section. After successful ventilation, continue with Step 3.

1.2.3 Step 3 – Check for Pulse

Check for a pulse is Step 3. Use the method previously described under blood circulation. If a pulse is present and the casualty is breathing, continue to Step 4. If a pulse is present, but the casualty is not breathing, begin rescue breathing as described in the next section. If no pulse is present, seek medical personnel immediately.

1.2.4 Step 4 – Check for Bleeding

Check for bleeding is Step 4. Look for spurts of blood or blood on the casualty's clothing. If the bleeding is from an open wound on the arm or leg, apply a field or pressure dressing as described later in this chapter. If bleeding is from a partial or complete amputation, apply a dressing as described later in this section, or apply a tourniquet IF bleeding persists. If the casualty is bleeding from an open head wound, chest wound, or abdominal wound, apply a dressing as described later.

NOTE

If the casualty is located in a chemically contaminated area, do not expose the wound. Apply a field and pressure dressing and evacuate the casualty.

1.2.5 Step 5 – Check for Shock

Step five is to check for shock. Look for the following signs or symptoms:

- Sweaty but cool skin
- Paleness of the skin. Note that darker-skinned service members will appear grayish.
- Restlessness or nervousness
- Thirst
- Loss of blood
- Confusion or lack of awareness
- Rapid breathing
- Blotchy or bluish skin
- Nausea or vomiting

If these signs or symptoms are present, begin the treatment for shock described later in this chapter.

1.2.6 Step 6 – Check for Fractures

Check for fractures is Step six. Look for the signs or symptoms of back or neck injuries:

- Pain or tenderness of the back or neck
- Cuts or bruises on the back or neck
- Inability to move or numbness (Check this by asking about the ability to move or by touching the arms and legs and asking about how he or she is feeling)
- Unusual body or limb position

Immobilize the casualty if a back or neck injury is suspected. Tell the casualty not to move. If you suspect a back injury, place padding under the arch of his or her back. If you suspect a neck injury, manually immobilize the casualty with padding under the neck and weighted boots on each side of the head.

Check the casualty's arms and legs for open fractures by noting bleeding or bones sticking out and check his or her pulse. Check for closed fractures by looking for swelling, discoloration, deformity, and unusual position of the extremity. Remember to check for a pulse.

If you suspect a fracture, begin the first aid measures for fractures described later in this chapter.

1.2.7 Step 7 – Check for Burns

Step seven is to check for burns. Look for reddened, blistered, or charred skin. Check for singed clothing. Burns to the upper torso may cause respiratory problems, so look for singed nose hair, soot around the nostrils, abnormal breathing sounds, or breathing difficulty. If burns are found, begin the first aid measures described later.

1.2.8 Step 8 – Check for Head Injury

The final step, Step eight, is to check for a possible head injury. Look for the following signs or symptoms:

- Unequal pupils
- Fluid from ear, nose, mouth, or the head injury itself
- Slurred speech
- Confusion
- Sleepiness
- Loss of memory or consciousness
- Staggering
- Headache
- Dizziness
- Nausea or vomiting
- Paralysis
- Convulsions or twitching
- Bruising around the eyes or behind the ears

If a head injury is suspected, watch for signs requiring rescue breathing, treatment for shock, or control of bleeding, and seek medical help.

2.0.0 FIRST AID MEASURES

2.1.0 Controlling Bleeding

2.1.1 General

Recognizing the types of bleeding and using the proper methods to control bleeding are critical first aid skills. From a minor cut to a sucking chest wound, the Seabee needs to be familiar with all types of bleeding and how to apply a battle dressing and other methods of controlling bleeding.

Properly and promptly stopping bleeding will save lives!

Blood circulates throughout the body by means of three different kinds of blood vessels: arteries, veins, and capillaries. See *Figure 10-4.* Arteries are the large vessels that carry blood from the heart. Arterial blood is usually bright red in color. If an artery near the skin surface is cut, the blood gushes out in spurts that are synchronized with the heart beat. However, if the artery is deeply buried, the bleeding may appear in a

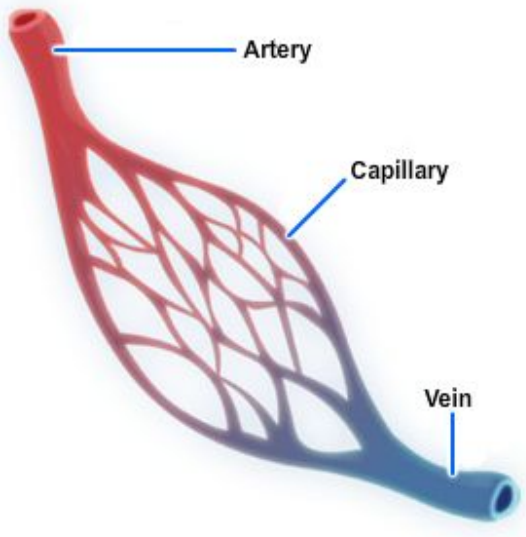


Figure 10-4 — Illustration of arteries, veins, and capillaries.

steady stream. Veins are the vessels that return blood to the heart. Blood from veins is dark red in color. If a vein is cut, the blood escapes in a steady stream. Capillaries form a connecting network of smaller vessels between the veins and arteries. Capillary blood is usually brick red in color. If capillaries are cut, the blood oozes out slowly.

To begin controlling bleeding, cut or tear any clothing necessary to expose the wound and observe the extent of the injury. If clothing is stuck to the wound, leave it alone. Do not touch the wound. Always check for entry and exit wounds. Exit wounds are usually larger.

While treating any wound, continually monitor vital signs, breathing and pulse, and take action accordingly. Do not attempt to remove bullets or other objects from the wound. If the wound is impaled by an object, do not remove the object; just apply the dressing, putting padding around the object to stabilize it.

When bleeding is from a leg or arm wound, elevate the extremity slightly above the casualty's heart. This is because the amount of blood entering is decreased by the uphill gravitational effect.

CAUTION

Do not elevate a limb until it is certain that no bones are broken or until broken bones are properly splinted.

2.1.2 Methods to Control Bleeding

There are several methods for controlling bleeding. We will look at applying a battle dressing, using direct pressure, applying a pressure dressing, the use of pressure points, and lastly applying a tourniquet.

2.1.2.1 Applying a Battle Dressing

Before you go into the field you will normally receive an individual first aid kit. Among the items in this kit are battle dressings. A battle dressing is a combination compress and bandage in which a sterile pad is fastened to a gauze, muslin, or adhesive bandage. Most Navy first aid kits contain both large and small size battle dressings of this kind. When applying a battle dressing, always use the casualty's first, not your own. You may need your own! You will see that each dressing has two tails used to secure the dressing when you are treating the injured. On the outer side of the dressing is written: "Put other side next to wound." This helps to make sure the sterile side is placed on the wound.

First, remove the wrapper and grasp the tails with both hands (*Figure 10-5, frame 1)*. Hold the dressing over the wound, white side down, and pull it open *(Figure 10-5, frame 2)*. Place it directly over the wound and hold it in place with one hand. With the other hand, wrap one tail around and half way over the wound, leaving enough to tie a knot *(Figure 10-5, frames 3 and 4)*. Wrap the other tail in the opposite direction, and then tie the tails at the edge of the dressing, not over the wound *(Figure 10-5, frame 5)*. Tie it firmly, but not tourniquet-like.

Interaction Available

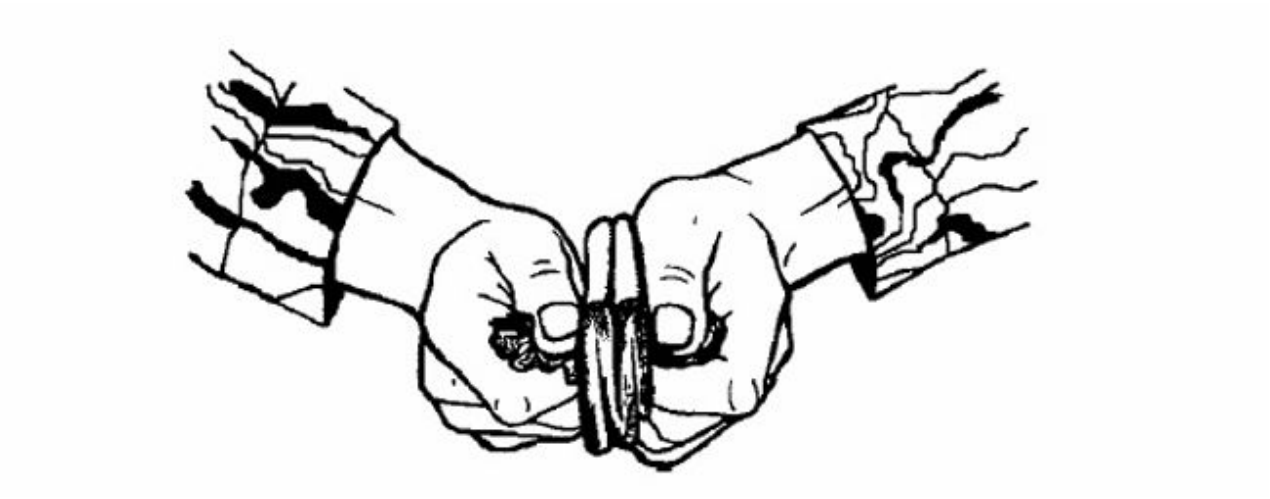


Figure 10-5 — Applying a Battle Dressing (Frames 1 thru 5).

You can reinforce dressings by applying additional sterile dressings over the battle dressing and covering the entire dressing with an elastic bandage.

2.1.2.2 Using Direct Pressure

If bleeding doesn't stop after applying a battle dressing, your next technique should be direct or manual pressure. Place your hand over the battle dressing and apply firm pressure for 5 to 10 minutes. If the casualty is conscious, he or she can do this. In almost all cases, bleeding can be stopped by direct pressure on the wound. See *Figure 10-6*.

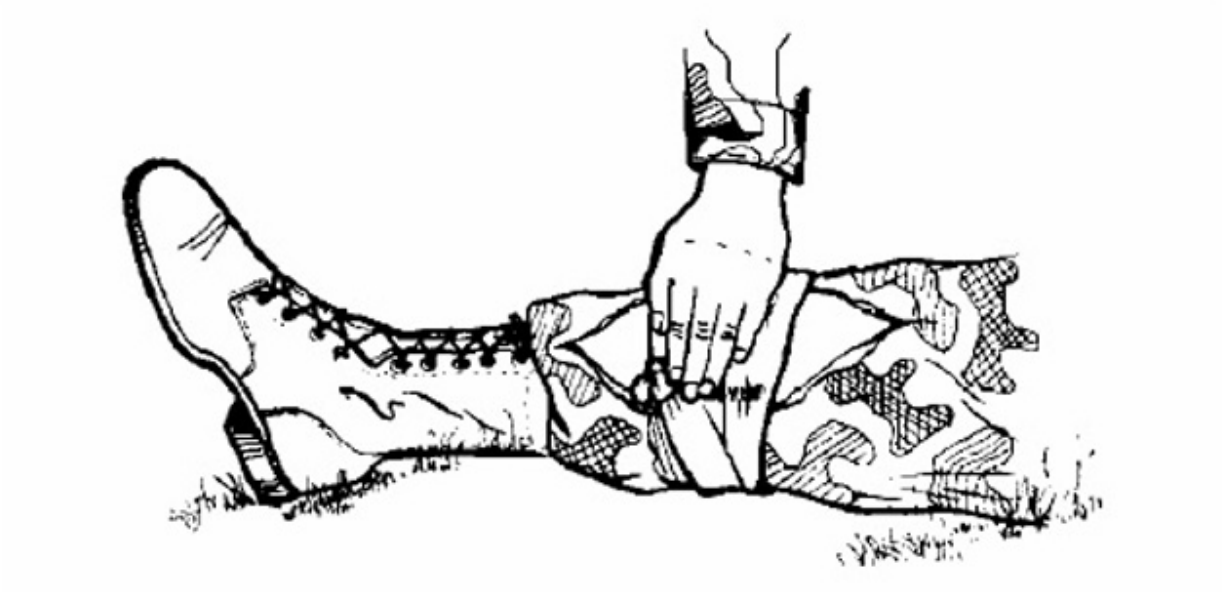


Figure 10-6 — Applying Direct or Manual Pressure.

2.1.2.3 Applying a Pressure Dressing

If bleeding persists, apply a pressure dressing over the battle dressing. This will aid in blood clotting and compress the open blood vessel. Do this by placing a wad of padding over the dressing at the wound location, keeping the extremity elevated if applicable. Secure the padding using a bandage or cravat, tying the ends directly over the wound using a nonslip knot. Improvised pressure dressings can be strips of cloth made from T-shirts, socks, or other clothing. See *Figure 10-7, frames 1 thru 4.*

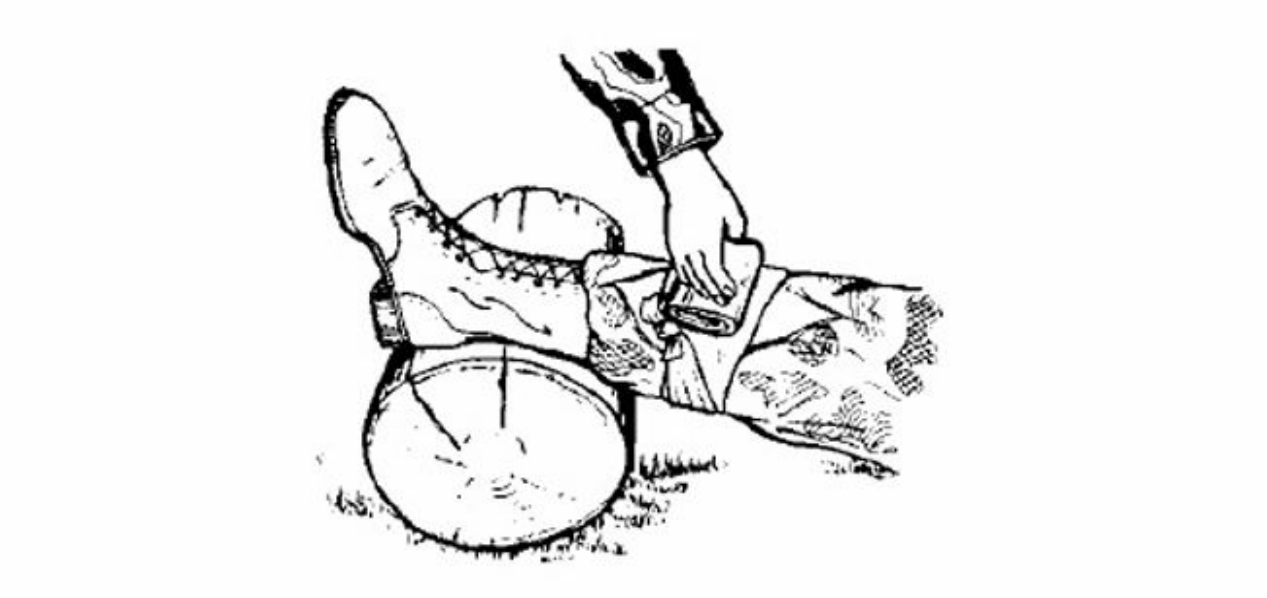


Figure 10-7 — Applying a Pressure Dressing.

Interaction Available

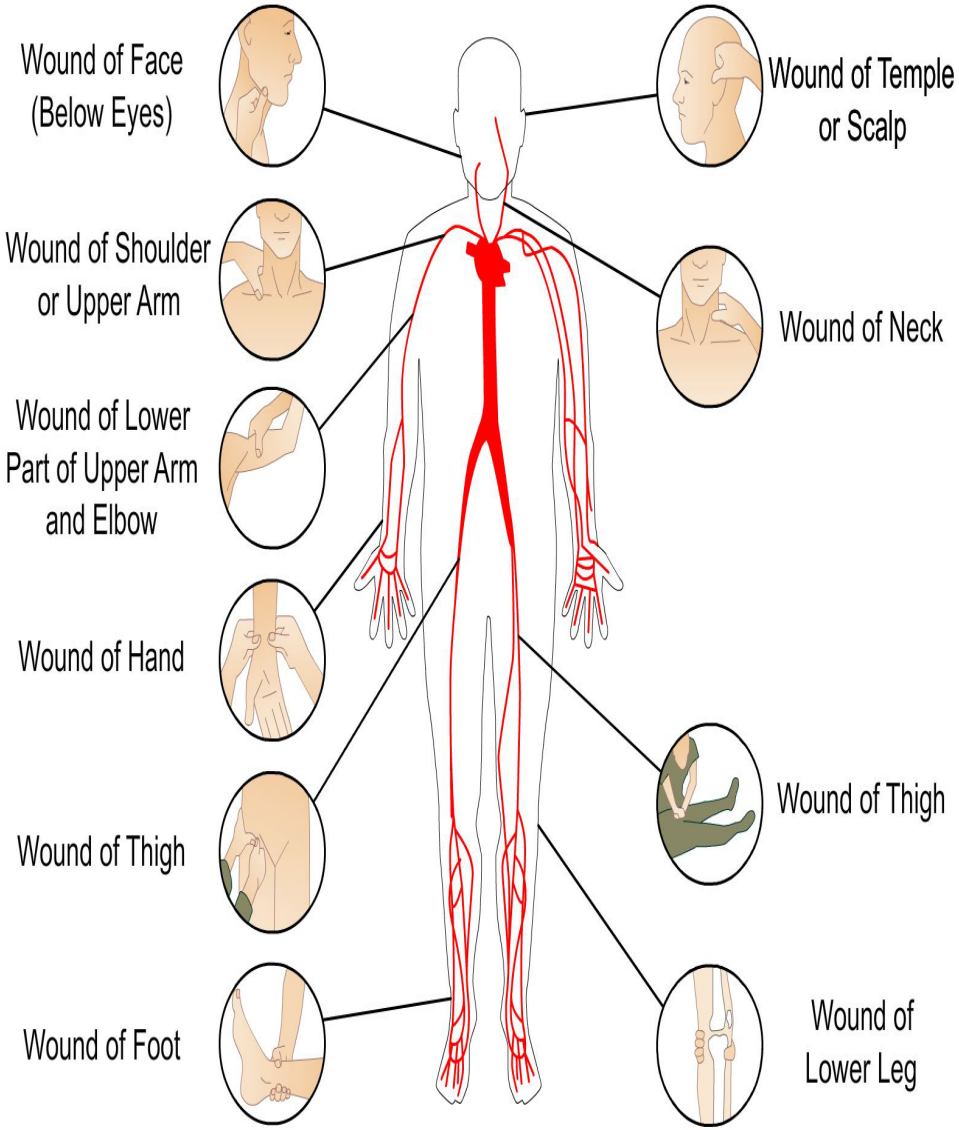
2.1.2.4 Using Digital Pressure

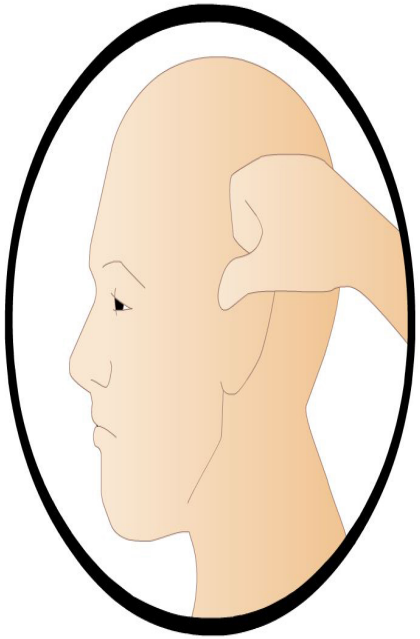
If bleeding continues, try digital pressure, also known as pressure points. Digital pressure is applying pressure using your fingers, thumb, or hand, to the appropriate pressure point. A pressure point is a spot where a main artery lies near the skin surface and over a bone or firm tissue. The objective of applying pressure is to compress the artery against the bone, thus shutting off the flow of blood from the heart to the wound. There are 10 principal pressure points on each side of the body. Refer to *Figure 10-8* while reading the following.

The first pressure point we'll look at is the superficial temporal artery. If the bleeding is in the region of the temple or scalp, use the finger to compress the main artery to the temple against the skull bone. This pressure point is just in front of the ear.

The next pressure point is the facial artery. Use this if bleeding occurs on the face below the level of the eyes. Apply pressure to the point on the lower jaw. To find this pressure point, start at the angle of the jaw, and run your finger forward along the lower edge of the lower jaw until you feel a small notch. The pressure point is in the notch.

The common carotid artery is the pressure point you will use if the neck is bleeding. Apply pressure below the wound, just in front of the prominent neck muscle. Press inward and slightly backward, compressing the main artery of that side of the neck against the bones of the spinal column. Do not apply pressure at this point unless it is absolutely essential. This is because there is a danger of pressing on the windpipe and thus choking the victim.





Interaction Available

Figure 10-8 — Pressure Points (Roll over to view details).

Look now at the pressure point at the subclavian artery. If the bleeding is in the shoulder or in the upper part of the arm, apply pressure with the fingers behind the collarbone. Press down against the first rib or forward against the collarbone.

The brachial artery is where you should apply pressure when bleeding is between the middle part of the upper arm and the elbow. The blood flow should be controlled by applying pressure in the inner side of the arm—that is, toward the body— about halfway between the shoulder and the elbow.

The radial and ulnar arteries are the spots to press to control bleeding from the hand. To do this, apply pressure at the wrist. If it is possible to hold the arm up in the air, the bleeding will be relatively easy to stop.

At the iliac artery, apply pressure to the middle of the groin to control bleeding in the thigh. Bleeding in the upper part of the thigh can be controlled by applying pressure to the femoral artery or the iliac artery.

At the femoral artery, bleeding in the upper part of the thigh can be controlled by applying pressure with the closed fist of one hand and using the other hand to give additional pressure. The artery at this point is deeply buried in some of the heaviest muscle of the body, so you must use a great deal of pressure to push the artery against the bone.

The next pressure point to consider is the popliteal artery. Control bleeding between the knee and the foot by applying firm pressure against the knee. Sometimes pressure at the side of the knee doesn't stop the bleeding. In this case, hold the front of the knee with one hand and thrust the fist hard against the artery behind the knee.

The last pressure point we'll discuss is the anterior and posterior arteries. Apply pressure to these arteries to stop bleeding from the foot.

Use digital pressure in combination with previously described techniques or when dressings are not available

2.1.2.5 Applying a Tourniquet

⚠ CAUTION ⚠

A tourniquet can be dangerous. Its application can cause tissue injury or even loss of a limb.

If bleeding continues after using other techniques, as a last resort, use a tourniquet. A tourniquet is a constricting band placed around an arm or leg to control bleeding and as previously mentioned, should only be applied as a last resort or if a limb has been severed. Once applied, the tourniquet must stay in place and the casualty must be taken to the nearest Medical Treatment Facility (MTF) as soon as possible. Do not loosen or release a tourniquet once it has been applied. See *Figure 10-9*.

In the absence of a specially designed tourniquet, use a strong, pliable material such as gauze or muslin bandages, clothing, or a cravat. Use this material with a rigid stick-like object and ensure the improvised tourniquet material is at least two inches wide. DO NOT use wire or a shoestring for a tourniquet band.

Place the tourniquet material around the limb, between the extremity and the torso or between the wound and the heart. Never place a tourniquet directly over a wound, fracture, or joint. For maximum effectiveness, place it on the upper arm or above the

knee. It should be well-padded and/or placed over a smoothed sleeve or trouser leg. If the material is long enough, wrap it around the limb several times, keeping the material flat.

Tie a half-knot, the same as the first part of tying a shoe lace. Next, place a stick or other rigid object on top of the half-knot and tie a full knot over the stick. Twist the stick until the tourniquet is tight around the limb and/or bright red bleeding has stopped. In the case of an amputation, dark oozing blood may continue to flow for a short time. Fasten the tourniquet to the limb by looping the free ends of the tourniquet over the ends of the stick, and then bring the ends around the limb to prevent the stick from loosening and tie the ends together on the side of the limb.

After applying the tourniquet, mark the casualty's forehead with a "T" and the time the tourniquet was applied. Check and treat the casualty for shock and seek medical aid. In the case of a severed limb, apply a dressing to the stump, and if possible, save and transport the limb with the casualty, but out of his or her sight to avoid shock.

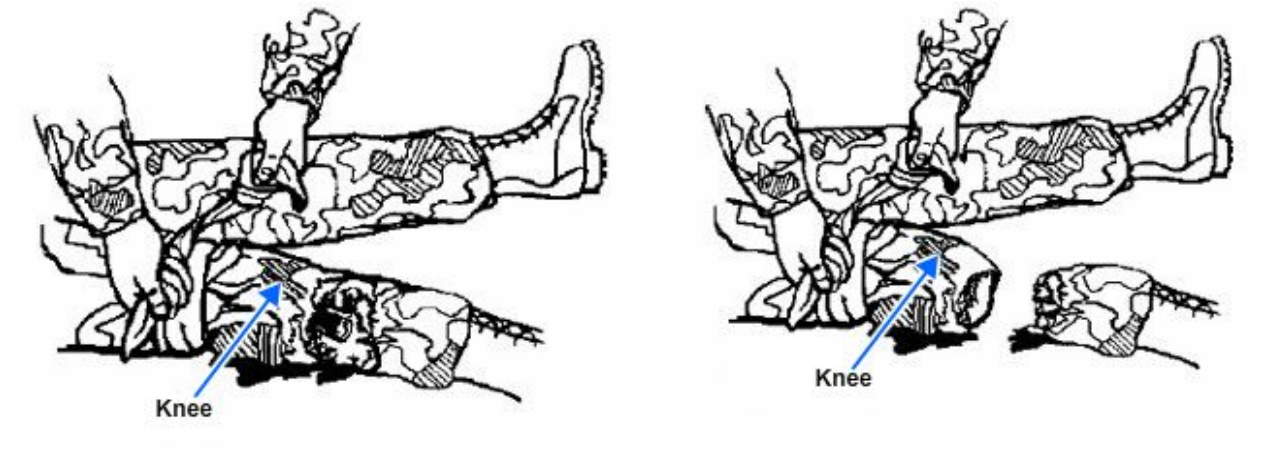


Figure 10-9 — Applying a Tourniquet, Frames 1 thru 5.

Interaction Available

2.2.0 Opening the Airway and Restoring Breathing

An inadequate airway and lack of breathing are two of the most critical situations in first aid. You must have oxygen to continue living! The third critical situation is the loss of blood circulation or stoppage of the heart. Before attempting to clear a casualty's airway or restore breathing, you should check the casualty for a pulse using one of the checkpoints on the wrist, neck, or ankle as described under Evaluating a Casualty. If no pulse is present you should immediately call for medical personnel, unless you have been properly trained in cardiopulmonary resuscitation or CPR.

2.2.1 Preliminary Assessment

Check the casualty for responsiveness or consciousness by gently shaking him or her and asking "Are you OK?" If you get no response, kneel beside the casualty and gently roll him or her onto the back by placing one hand under his or her head and neck for support, then grasp the far arm and roll him or her toward you. See *Figure 10-10*.

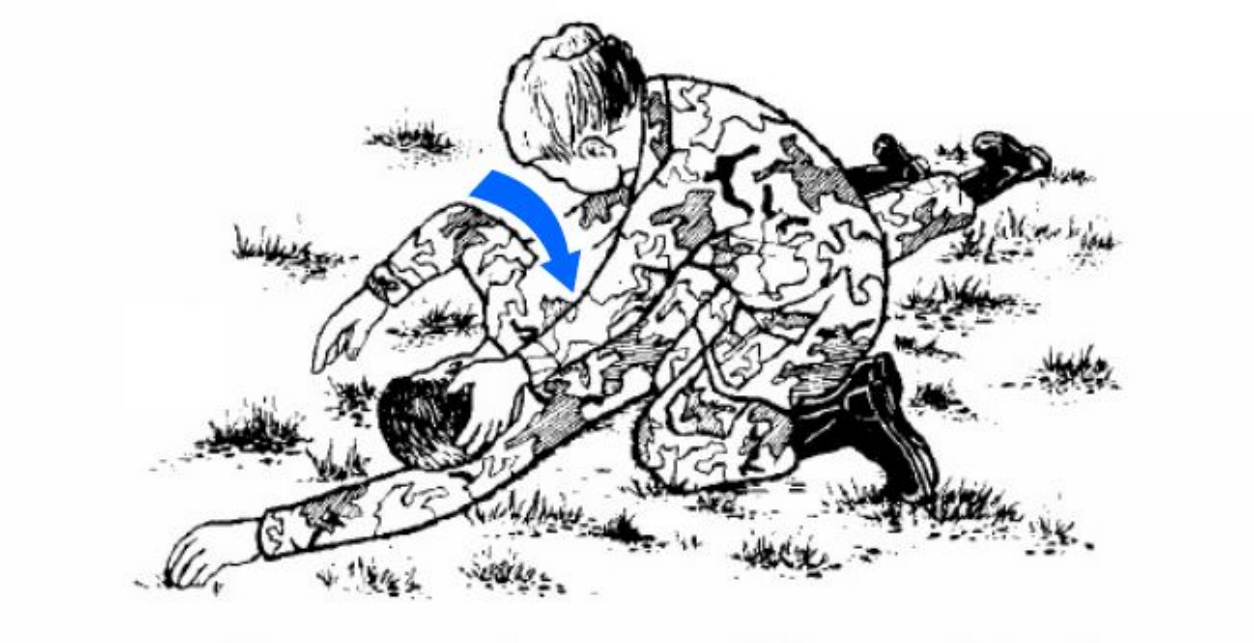


Figure 10-10 — Positioning the Casualty for a Preliminary Assessment.

NOTE

If you suspect he or she has a broken back or neck, DO NOT shake or move the casualty unless located in an area of immediate danger.

Place the casualty's arms at the sides and straighten out his or her legs. Next, you need to check for breathing. Look for the rise and fall of the chest, listen for the sounds of breathing, and feel his or her breath on the side of your face. If the casualty is not breathing or appears to be having difficulty breathing, you will need to perform a finger sweep of his or her mouth. Open the casualty's mouth using your crossed thumb and finger to exert pressure upwards on the upper teeth and downwards on the lower (*Figure 10-11*). Crook the index finger on your other hand, insert it against the inside of



Figure 10-11 – Using the crossed-finger method to open the casualty's mouth.

the casualty's cheek, and sweep across to the other side of the mouth. Remove any foreign matter you find, but do not spend too much time doing so (*Figure 10-12*).



Figure 10-12 – Using the finger to dislodge foreign matter.

WARNING

Take care not to force an object deeper into the airway by pushing it with your finger.

If the casualty is still not breathing, or you are unsure, you will need to perform one of the methods of rescue breathing. Performing rescue breathing on a casualty that is breathing on their own can do no harm.

2.2.2 Opening the Airway

Before performing rescue breathing, you need to open the casualty's airway. Kneel at his or her side and position the head to open the airway using either the jaw-thrust or head-tilt/chin-lift method. If you suspect the casualty has a neck injury or severe head injury, you should use the jaw-thrust technique to open the airway. Otherwise, use the head-tilt/chin-lift technique by placing one hand on the casualty's forehead and tilting the head back with firm, backward pressure. Next, place the fingers of the other hand under the bony part of the lower jaw and lift, bringing the chin forward. Do not use your thumb. See *Figure 10-13*.



Figure 10-13 – Head-tilt/Chin-lift technique of opening the airway.

To perform the jaw-thrust technique to open the casualty's airway, kneel at the casualty's side. Use both hands to grasp the lower jaw at each side and lift forward and up. If this is unsuccessful, tilt the head back slightly. See *Figure 10-14*.

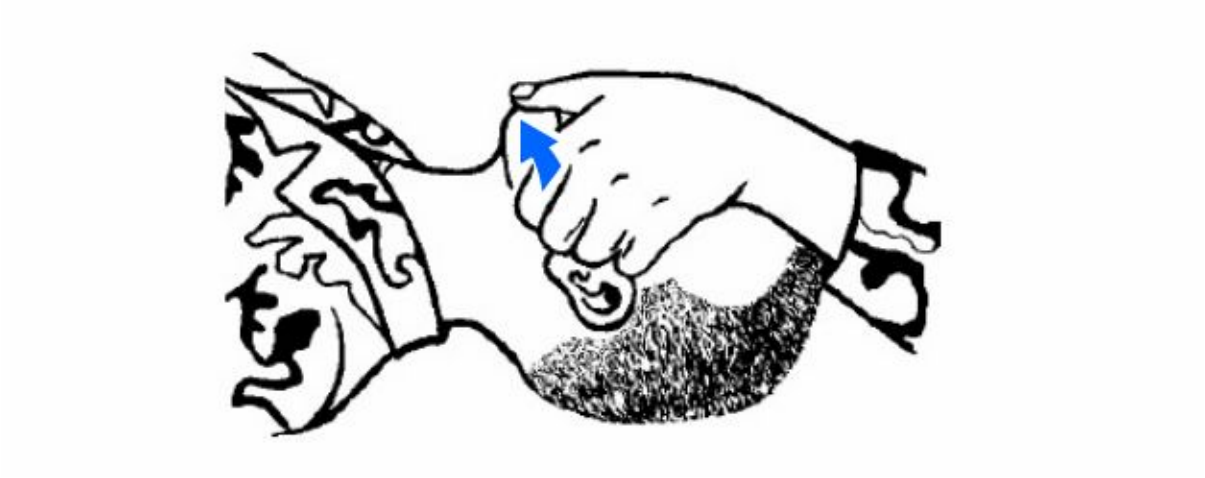


Figure 10-14 – Jaw-thrust technique of opening the airway.

With either technique, once the casualty's airway is opened, maintain the head position to keep the airway open. After opening the casualty's airway and before you begin rescue breathing, check again to see if the casualty has already begun breathing on his or her own. Often, just clearing and opening the airway will allow the casualty to

breathe properly. If the casualty does begin breathing on his or her own, continue to monitor the casualty and transport him or her to an MTF as soon as possible.

2.2.3 Rescue Breathing

If the casualty is still not breathing, you need to begin rescue breathing. There are two basic methods, mouth-to-mouth and mouth-to-nose. Mouth-to-mouth is the preferred method, but you should use the mouth-to-nose method if the casualty has a severe jaw fracture, a wound to the mouth, or the jaws are clamped shut by spasms.

2.2.3.1 Mouth-to-Mouth Method

To perform mouth-to-mouth rescue breathing, place the casualty on his or her back, face up. Next, place one hand on the forehead and pinch the nostrils closed. Place the fingertips of the other hand on the bony part of the chin and lift. If you suspect the casualty has a neck injury and used the jaw-thrust technique for clearing the airway, close the nostrils by placing your cheek against them.

Now, take a deep breath, place your mouth around the casualty's mouth, and blow two full breaths into the mouth, one to one and a half seconds per breath, taking a breath of fresh air before each breath. If the casualty is too small, as with a child, cover both the nose and mouth with your mouth.

Watch for the casualty's chest to rise. If the chest does not rise, reestablish an open airway; ensure no leakage, and try again. If the chest still isn't rising, clear the obstruction from the mouth or throat using one of the methods described in the next section. After each two breaths, check for a pulse at the neck. If you find a pulse and the casualty appears to be breathing on his or her own, STOP. If a pulse is found but the casualty is still not breathing on his or her own, continue rescue breathing. If no pulse is found, seek medical help immediately!

2.2.3.2 Mouth-to-Nose Method

The mouth-to-nose method of rescue breathing is performed in the same manner as the mouth-to-mouth method, except that you blow into the nose while holding the lips closed with one hand under the chin. Remove your mouth after each breath to allow the casualty to exhale. It may be necessary to part the lips to allow the casualty to exhale. Check for a pulse after each two breaths, taking action as described for the mouth-to-mouth method.

2.2.4 Clearing an Obstructed Airway

If the casualty is not breathing, or appears to be choking, ensure they have a clear, unobstructed airway. A casualty's upper airway may be obstructed for a number of reasons, including the casualty's tongue falling back into his or her throat while he or she is unconscious, foreign matter becoming lodged in the throat, regurgitation of stomach contents into the throat, or blood clots due to head or facial injuries.

If a casualty is conscious but choking, do not interfere. Encourage the casualty to cough up the obstruction.

If coughing doesn't work, or the casualty is unconscious but hasn't responded to rescue breathing, you need to clear the obstructed airway using either the abdominal thrust or chest thrust method. Use the abdominal thrust method unless the casualty is in the advanced stages of pregnancy, is markedly obese, or has a significant abdominal wound. In these cases, use the chest thrust method.

2.2.4.1 Abdominal Thrust on a Conscious Casualty, Standing or Sitting

To perform the abdominal thrust (or Heimlich maneuver) on a conscious casualty who is standing or sitting (*Figure 10-15*).

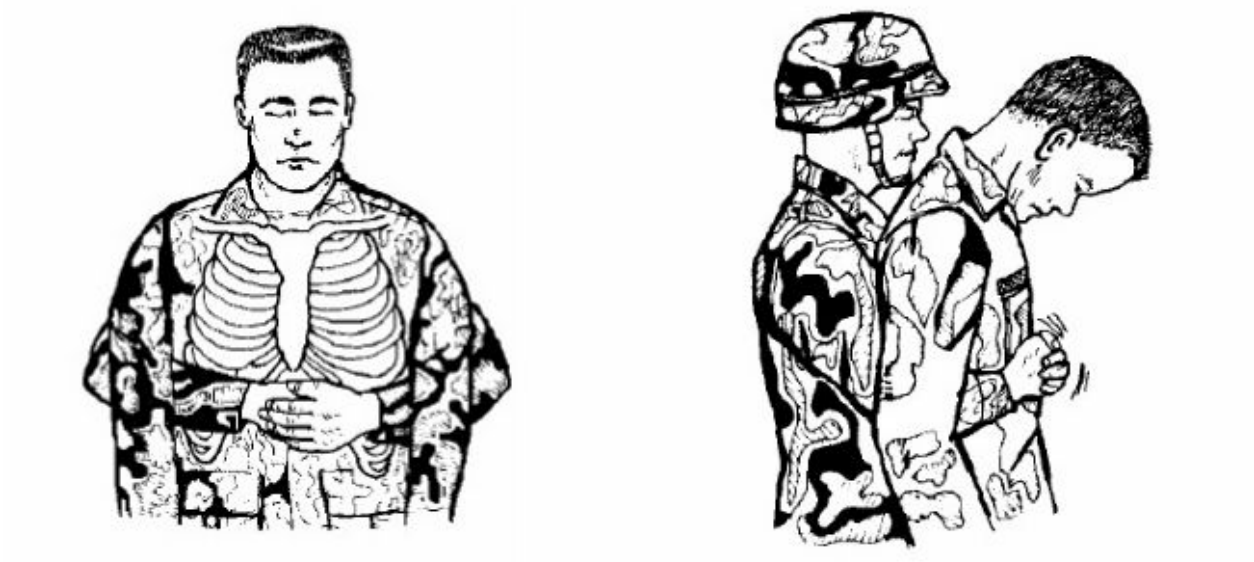


Figure 10-15 — Anatomical and profile views of the abdominal thrust on a conscious casualty, sitting or standing.

- Stand behind the casualty.
- Wrap your arms around the casualty's waist.
- Make a fist with one hand and grasp it with the other.
- The thumb side of your fist should be against the abdomen, in the midline, and slightly above the navel, but well below the breastbone.
- Press your fists into the abdomen with a quick backward and upward motion.
- Each thrust should be a separate and distinct movement.

Continue until the obstruction is expelled or the casualty becomes unresponsive.

NOTE

If the casualty becomes unresponsive, call for help and begin rescue breathing after positioning the casualty to open the airway.

2.2.4.2 Chest Thrust on a Conscious Casualty, Standing or Sitting

To perform the chest thrust on a conscious casualty while standing or sitting (*Figure 10-16)*:

- Stand or sit behind the casualty.
- Wrap your arms around his or her chest, with your arms under the armpits.
- Make a fist and place the thumb in the middle of the breastbone, avoiding the tip of the breastbone and the edges of the ribs.
- Grasp your fist with your other hand.
- Exert thrusts slowly and distinctly.

Perform this technique until the obstruction is expelled or the casualty becomes unresponsive. If he or she becomes unresponsive, call for help and begin rescue breathing.



Figure 10-16 – Profile view of a the chest thrust on a conscious casualty, sitting or standing.

2.2.4.3 Abdominal Thrust on an Unconscious Casualty, Lying Down

If opening the airway and attempting rescue breathing fails, perform the abdominal thrust 6 to 10 times while the casualty is lying down. To do this (*Figure 10-17*):

- Kneel astride the casualty's thighs
- Place the heel of one hand against the abdomen, in the midline slightly above the navel, but well below the breastbone, with the fingers pointed toward the head
- Press into the abdomen with a quick thrust forward and upward

Repeat the sequence of abdominal thrust, finger sweep of the mouth, and rescue breathing as long as necessary to clear the obstruction and restore breathing.



Figure 10-17 — Performing the abdominal thrust on an unconscious or unresponsive casualty.

2.2.4.4 Chest Thrust on an Unconscious Casualty, Lying Down

If the casualty does not respond to rescue breathing, perform the chest thrust with the casualty on his or her back, face up, and mouth open (*Figure 10-18*):

- Kneel close to the casualty's side.
- Locate the lower edge of the ribs with your fingers and run your fingers up along the center of the rib cage to the notch (*Figure 10-18, view A*).
- Place your middle finger on the notch and your index finger next to it on the lower edge of the breastbone.
- Place the heel of your other hand on the lower half of the breastbone, next to your two fingers (*Figure 10-18, view B*).
- Remove your two fingers and place that hand on top of the hand positioned on the breastbone, extending or interlocking your fingers (*Figure 10-18, view C*).
- Straighten and lock your elbows with your shoulders directly above your hands.
- Apply enough downward pressure to depress the breastbone 1 ½ to 2 inches; then release the pressure completely. See *Figures 10-18, view D and 10-19*.
- Do this 6 to 10 times, delivering each thrust quickly and distinctly.

Repeat the sequence of chest thrust, finger sweep of the mouth, and rescue breathing as long as necessary to clear the obstruction and restore breathing.

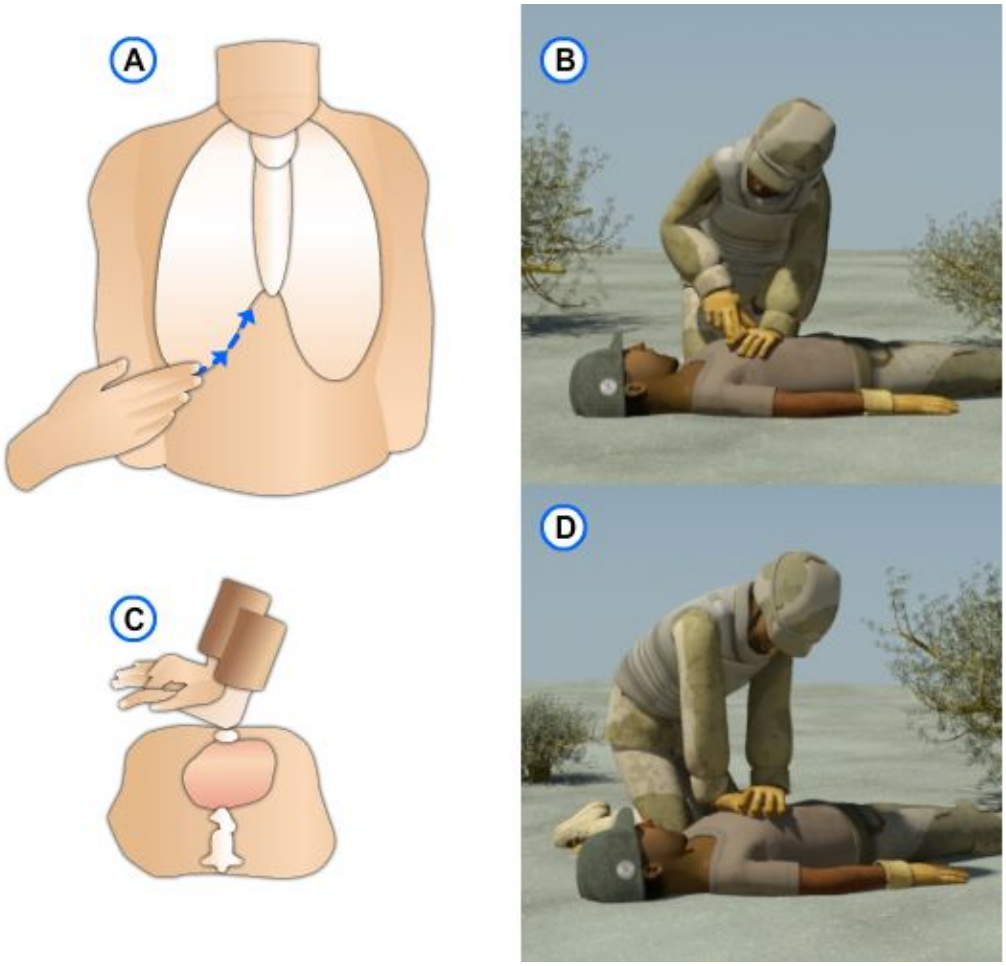


Figure 10-18 — Hand placement for performing the chest thrust on an unconscious or unresponsive casualty.

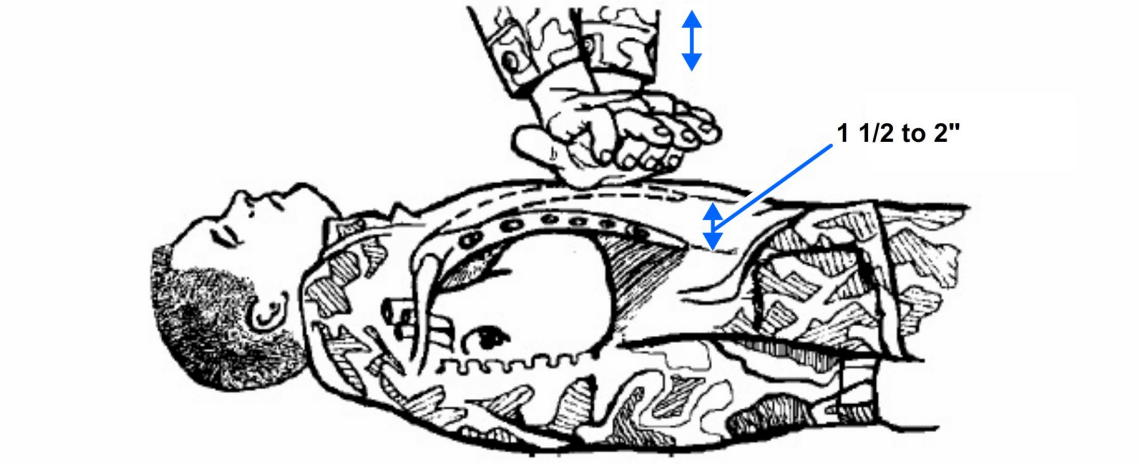


Figure 10-19 — Showing breastbone depression when performing the chest thrust on an unconscious or unresponsive casualty.

2.3.0 Recognizing and Treating Shock

Shock is the collapse of the body's cardiovascular system, including an inadequate supply of blood to the body's tissue. Shock stuns and weakens the body. Recognizing shock and applying the proper first aid measures in a timely manner can save a fellow Seabee's life. The three basic mechanisms associated with shock are heart damage, blood loss causing insufficient volume of blood, and inadequate circulation of blood caused by the blood vessels opening too wide.

Shock may result from dehydration, allergic reactions, significant blood loss, reaction to the sight of blood or a wound, or traumatic injuries such as burns, gunshot wounds, crush injuries, etc.

2.3.1 Signs and Symptoms

As the one administering first aid, it's important that you be able to recognize the signs of shock. They do not always appear at the onset of the injury. Some of these signs are the following:

- The casualty's pulse tends to be weak and rapid.
- The face and skin may be very pale or ashen gray.
- Breathing is likely faster than normal.
- The skin feels cool and clammy, and is covered in sweat.
- The casualty's skin may be blotchy or bluish, especially around the mouth and lips.

Another way to assess a case of shock is to look for symptoms. Symptoms are things the casualty feels. The symptoms of shock are direct or indirect evidence that circulation has been disturbed. Look for feelings of restlessness or nervousness. He or she may be thirsty. There may be nausea or vomiting, and the casualty may be confused and lack awareness of his or her surroundings.

2.3.2 First Aid Measures

When treating a casualty for any injury or illness, you should assume he or she is already suffering from shock or that shock will soon occur. Since the first aid measures to apply for shock are the same as those for preventing it, you should begin treating for shock and not wait for signs to appear.

First, move the casualty to cover if feasible. Lay the casualty on his or her back, unless he or she is experiencing difficulty breathing, in which case allow the casualty to sit upright but monitor closely. Elevate the feet higher than the heart using a stable object such as a field pack.

WARNING

DO NOT elevate the feet if there is an unsplinted broken leg, head injury, or abdominal injury. If the casualty has an abdominal injury, bend his or her legs at the knee.

Next, loosen the casualty's clothing around the neck, waist, and any place it seems binding. It is important to maintain the casualty's body temperature. In hot weather,

place the casualty in the shade and protect him or her from becoming chilled. In cold weather, place blankets over and under the casualty to keep him or her warm.

You should reassure and keep the casualty calm by sounding authoritative and self-confident. Assure the casualty you are there to help.

WARNING

DO NOT give the casualty food or drink. If he or she is unconscious or you need to leave the casualty unattended, turn the head to the side to prevent choking if he or she vomits.

Seek medical aid as soon as possible and continually monitor the casualty's condition until medical personnel arrive or the casualty is transported.

2.4.0 Fractures

Many kinds of accidents cause injuries to the bones, joints, and muscles. In providing first aid to injured people, you must always look for signs of fractures. A fracture is any break in the continuity of a bone; a dislocation is when a joint is not in the proper position; and a sprain is when the connecting tissues of joints have been torn. This section will be concerned mostly with fractures.

There are two types of fractures, closed and open. A closed fracture is one where the injury is completely internal—no broken skin (*Figure 10-20, view A*). An open fracture is where there is a break in the skin and tissues, caused by the broken bone protruding (*Figure 10-20, view B*) or a missile that broke the bone (*Figure 10-20, view C*), leaving an opening. Open fractures should always be considered contaminated and subject to infection.

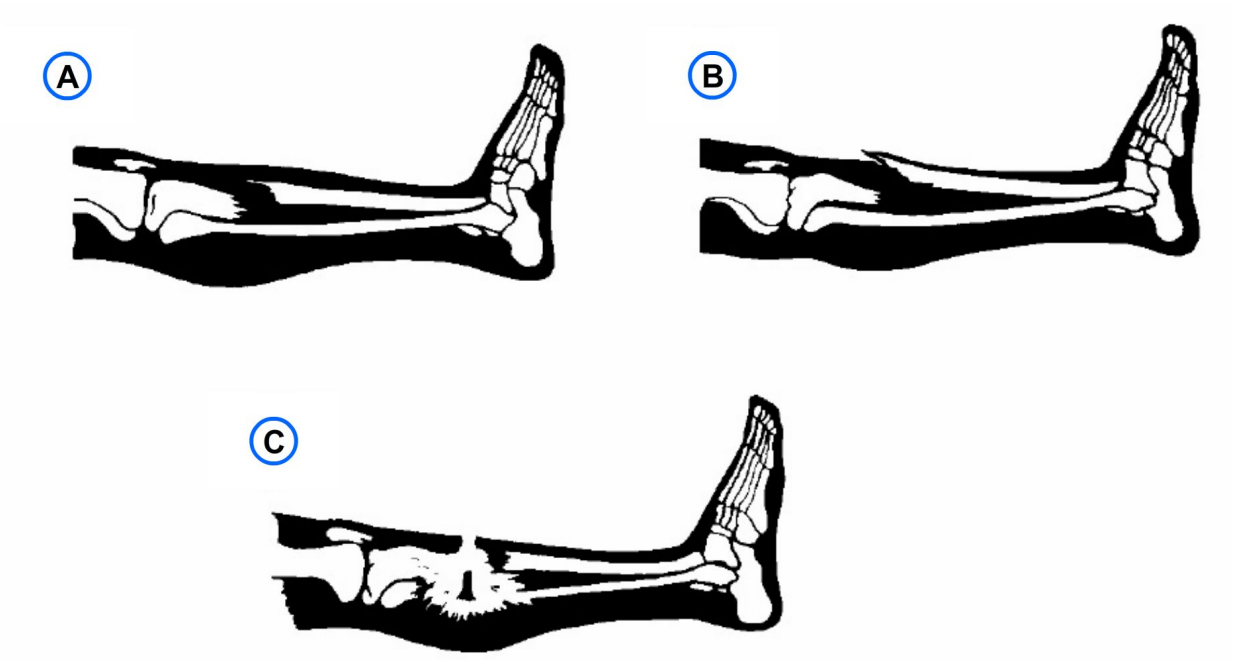


Figure 10-20 — Types of fractures.

2.4.1 Signs and Symptoms

You may not always be able to actually see the broken bone, but there are signs and symptoms to look for in a casualty that can tip you off. You might see deformity in the area of the injury. There may be pain or swelling. The casualty will be unable to move that portion of the body or there may be unnatural movement of the injured part. The casualty may also feel a grating sensation at the point of injury. If you are unsure if the casualty has a fracture, treat the injury as a fracture. Medical professionals can make a firm diagnosis later.

WARNING

Do not have the casualty move the injured parts in order to identify a fracture, as any movement could cause further injury.

2.4.2 General Rules

Follow these general rules in treatment of a fracture. Treat the open fracture tissue wound immediately by covering all wounds with a dressing. That means before you treat the fracture. You should also always treat a fracture victim for shock.

Splint the casualty in the position you find him or her. Do not attempt to straighten out the limb. Do not attempt to push the bone of an open fracture back under the skin. Do not attempt to set the fracture—just splint it.

You immobilize the suspected fracture to prevent sharp edges of the bone from causing more damage. It will also reduce pain and help prevent or control shock. If it is a closed fracture, immobilization will prevent an open wound and possible infection.

2.4.3 Splinting Procedures

To prepare for splinting, reassure the casualty, loosen any tight or binding clothing, and remove all jewelry from the injured limb. Do not remove boots unless you need to stabilize a neck injury or the foot is bleeding.

Next, gather splinting materials and padding, improvising as needed.

Splints: An object that can be used to immobilize a fracture or a dislocation is called a splint. There are two types of splints: soft and rigid. Soft splints include such things as pillows, blankets, towels, and dressings. Rigid splints are stiff and allow very little flexibility. Splints should be lightweight, strong, and long enough to reach the joints above and below the fracture. Lacking proper splints, boards, poles, sticks, tree limbs, or even cardboard may be used as splints. If nothing is available, the chest can be used to immobilize a fractured arm and the uninjured leg can be used to immobilize the fractured leg (*Figure 10-21 and 10-22)*.



Figure 10-21 — Uninjured leg used as a splint for a fractured leg.



Figure 10-22 — Chest wall used as a splint for a fractured arm.

Padding: Padding may be improvised from such items as a jacket, blanket, poncho, or even leafy vegetation.

Bandages: Bandages may be improvised from belts, rifle slings, or strips of clothing or blankets. Narrow materials such as wire or cord should not be used to secure a splint in place, as these could cause tissue damage and a tourniquet effect.

Slings: A sling is a bandage or cravat tied around the neck to support a fractured arm or shoulder. If a bandage is not available, a sling can be improvised from pieces of clothing or blankets.

Swathes: Swathes are pieces of cloth or load bearing equipment (LBE) that are used to further immobilize a splinted fracture. Triangular and cravat bandages are often used and are called swathe bandages. The purpose of the swathe is to immobilize; therefore, the swathe bandage is placed above and/or below the fracture—not over it.

Check the circulation below the site, looking for:

- Pale, white, or bluish-gray skin
- Colder skin temperature below the site

If you suspect poor circulation, evacuate the casualty immediately.

Apply the splint. See *Figure 10-23*. Position one splint on each side of the fracture so that they extend both above and below the fracture. Tie off the splinting materials above and below the site. Check the splint for tightness, ensuring it is tight enough to hold in place, but not so tight it impairs circulation. For fractures on the upper arm or shoulder, use a sling. Use swathes to hold an arm against the side, or to hold legs together. See *Figure 10-21 and 10-22*.

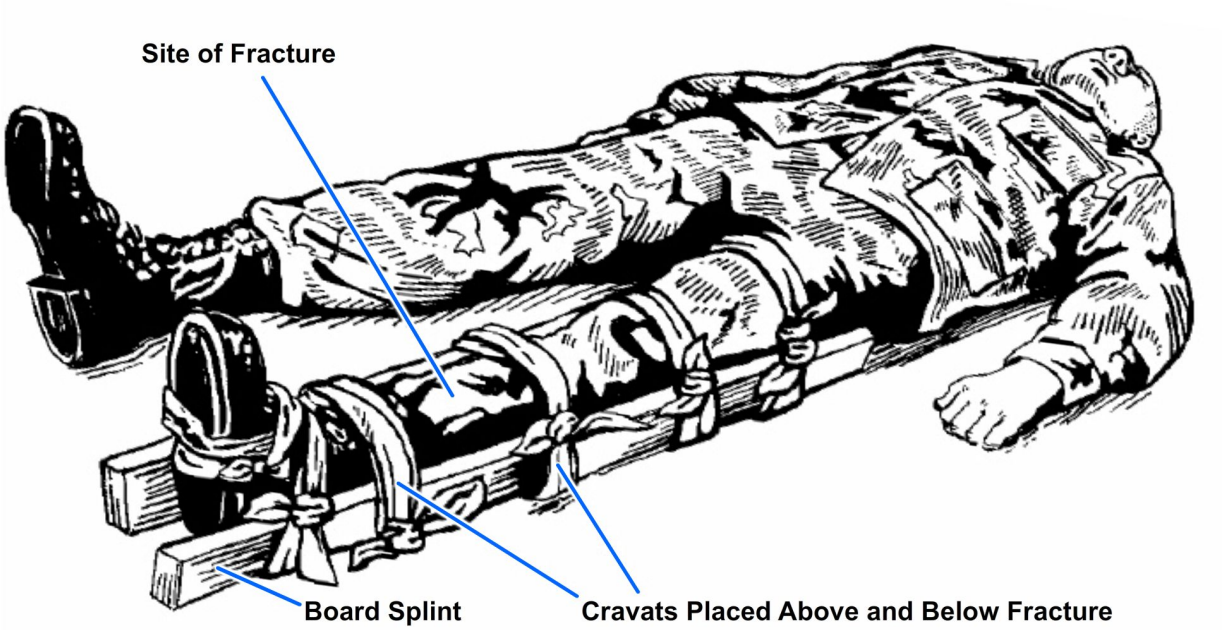


Figure 10-23 — Board splints applied to a fractured lower leg.

NOTE

After splinting, check the casualty's pulse and motor sensation at a point farther from the heart than the splint, e.g., for a splinted forearm, check the wrist for pulse, hand for motor and sensation. This is important. Splinting too tightly can create the same bad effect as a tourniquet.

2.4.4 Applying a Sling

To help immobilize a fractured arm, you should apply a sling. A sling is also used to immobilize a fractured collarbone, or a fractured or dislocated shoulder. Slings can be made from any non-stretching cloth such as shirts, trousers, ponchos, or belts. The supporting pressure of a sling should be on the casualty's uninjured side. Support the arm with the hand slightly higher than the elbow, with the fingers exposed, to aid in circulation.

Use the following procedures to apply a sling (*Figure 10-24*):

- Insert the splinted arm, or the arm on the side of the fractured shoulder or collarbone, in the center of the sling.
- Bring the ends of the sling up and around the casualty's neck, then tie them in the hollow of the neck on the uninjured side.

- Roll the corner of the sling at the elbow and tuck it in.

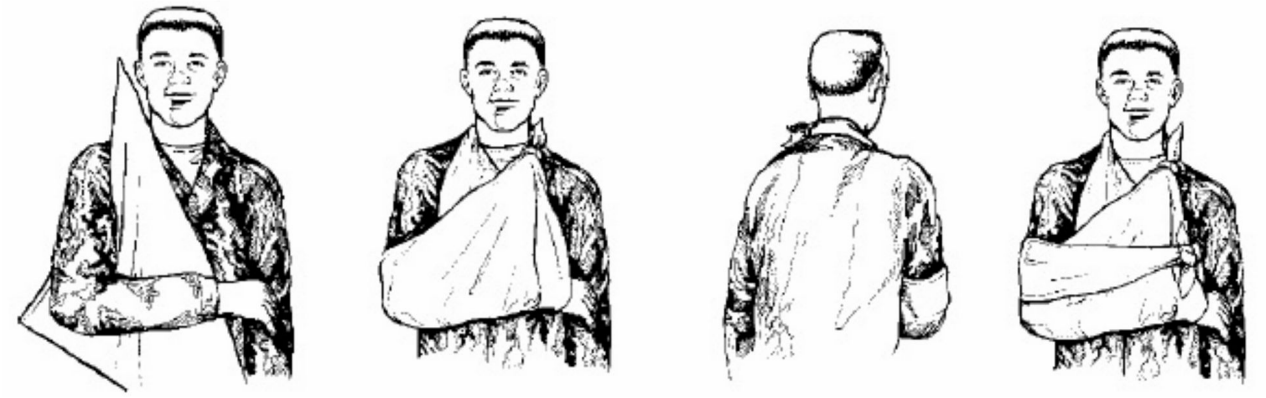


Figure 10-24 – Application of a triangular bandage to form a sling.

2.4.5 Treatment for Specific Fractures

2.4.5.1 Jaw, Collarbone, and Shoulder Fractures

If a casualty has a fractured jaw, you need to immobilize it (*Figure 10-25*). To do so, apply a cravat vertically around the head and under the jaw, then add another cravat



Figure 10-25 — Applying a cravat bandage for a fractured jaw.

around the top of the head to secure the first one. Do not apply the cravat to the back of the neck. Do not lay the casualty on his or her back, as this may cause an obstruction of the airway.

In the case of a fractured collarbone, apply two belts, a sling, and a cravat to immobilize the area as in *Figure 10-26*. With a fractured or dislocated shoulder, apply a sling and a cravat or swathe. See *Figure 10-27*.



Figure 10-26 – Immobilizing a fractured collarbone.

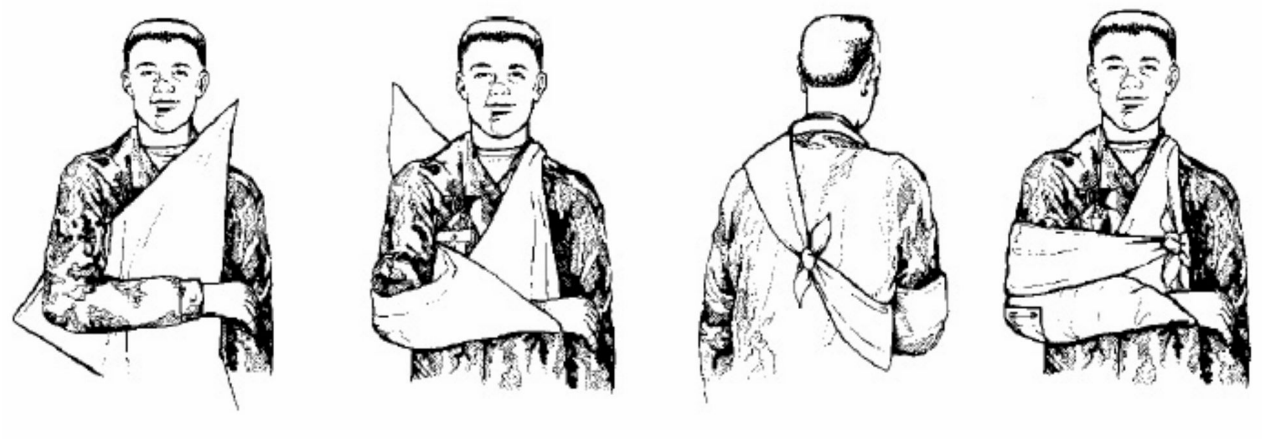


Figure 10-27 – Immobilizing a fractured or dislocated shoulder.

2.4.5.2 Spinal Column Fractures

It is impossible to be sure if a casualty has suffered a spinal column fracture. A fracture is likely if the casualty has fallen, his or her back has been sharply struck or bent, or there is no feeling in the legs or the legs can't move. If the spine is fractured, bending it can cause the sharp bone fragments to bruise or cut the spinal cord and result in permanent paralysis or death.

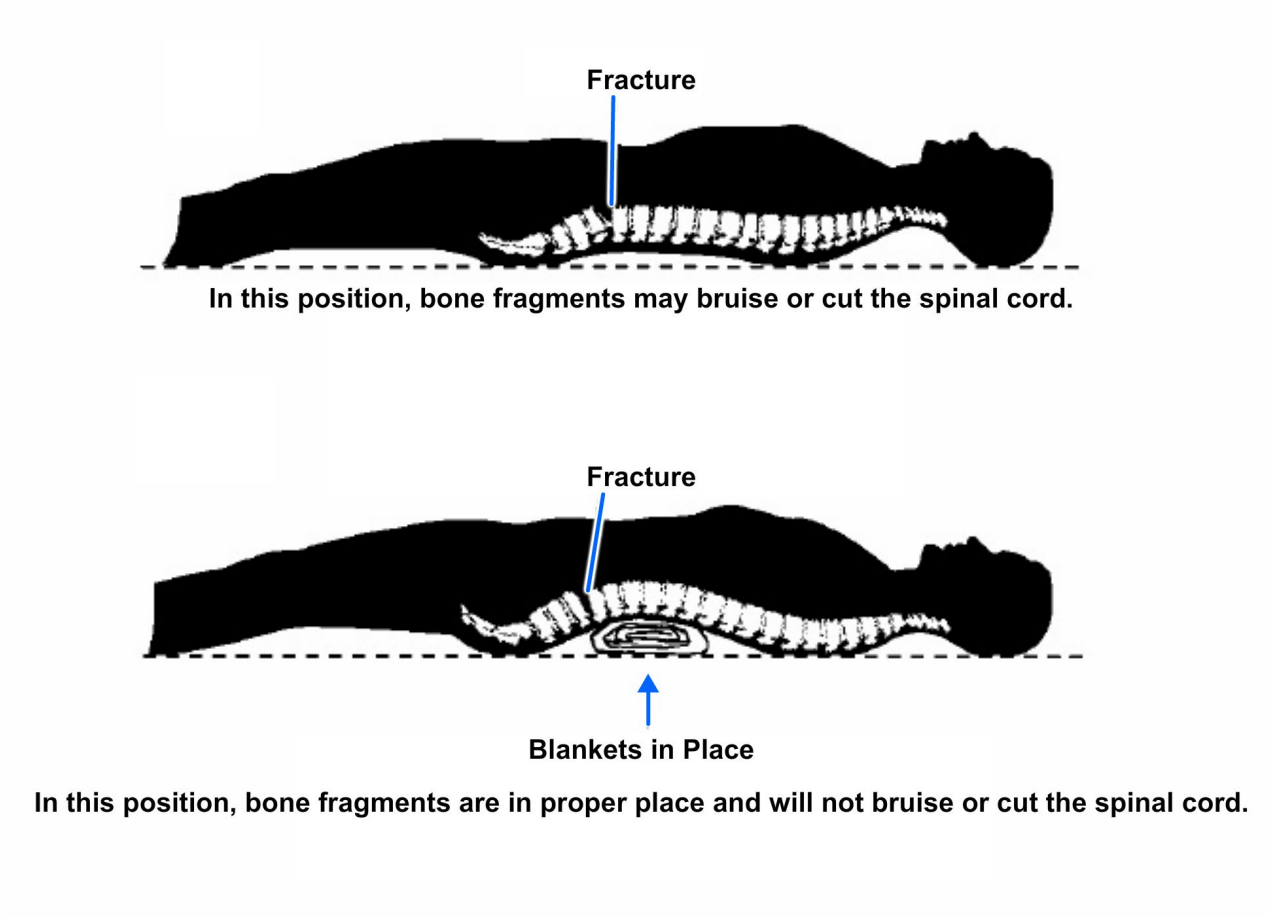


Figure 10-28 – Maintaining a normal spinal position.

While you are waiting for transport and medical assistance, maintain a normal spinal position at the lower back (*Figure 10-28*). Caution the casualty not to move and leave the casualty in the position he or she was found. Do not move any part of the body. If the casualty is face up, you can slip a blanket under the arch of the lower back. If found face down, do not put anything under him or her.

If the casualty must be moved, a four man team will be needed to do so safely.

2.4.5.3 Neck Fractures

When treating neck fractures, caution the casualty not to move, and leave the casualty in the position he or she was found.

If the neck or head is in an abnormal position and the casualty is lying face up, raise the shoulders slightly and slip a roll of bath towel or something of similar bulk under the neck. Do not bend the head or neck forward and do not raise or twist the head. Immobilize the head using boots or heavy objects on each side of it (*Figure 10-29*).



Figure 10-29 — Immobilizing a fractured neck.

If the head or neck is in an abnormal position and the casualty is lying face down, do not move the casualty. Immobilize the head with boots or heavy objects on each side of it, but do not put a roll under the neck. Do not bend the head or neck or attempt to roll the casualty onto his or her back.

If transportation is necessary, at least two people will be required.

2.5.0 Burn Injuries

Burns are injuries that most commonly result from exposure to fire, chemicals, or electricity. The severity of burns depends on the depth, size, and location. Burns are most serious when they are located on the face, neck, hands, and feet. Also, they are dangerous when combined with fractures. There are four types of burns you should learn to recognize and treat; thermal, electrical, chemical, and laser. Thermal burns are caused by fire, hot objects, liquids, or gases. Electrical burns are caused by electrical wires, current, and lightning. Chemical burns are caused by coming in contact with wet or dry chemicals or white phosphorous. Laser burns are burns to the eye, causing an ocular injury.

2.5.1 Eliminate the Source

The first step to take with all types of burns is to eliminate the source of the burn. After eliminating the source, you can evaluate the casualty and provide appropriate first aid measures.

You should take the following actions to eliminate the source of the burn injury:

- With thermal burns, remove the casualty from danger, cover him or her with non-synthetic material, and if still on fire, roll him or her on the ground to extinguish the fire.
- In the case of an electrical burn, remove the source of current by turning it off if it is close enough. Wrap non-conductive material around the casualty's back and

shoulders and drag the casualty away. Do not make direct contact with the casualty or touch any wires.

- When the casualty has been exposed to chemicals, remove liquid chemicals by flushing the casualty with large amounts of water.
- Remove dry chemicals by brushing off the particles from the casualty, but do not use your bare hands. Afterwards, flush the casualty with either large amounts of water or none at all, as insufficient amounts of water may cause a chemical reaction and make matters worse.
- If the burn is from white phosphorous, smother the chemical with wet clothes or mud and keep the casualty covered.
- In the case of a laser burn, remove the casualty from the beam and make sure you do not look directly at the beam yourself.

2.5.2 First Aid Measures

After removing the source of the burn, evaluate the casualty for other conditions requiring first aid, such as problems with breathing, weak or no pulse, or other wounds. Expose the burn by removing any clothing over the burn unless it is stuck to the wound. If the casualty's hands or wrists are burned, remove any jewelry.

Next, apply a field dressing. For electrical burns, check for both entry and exit burns. The exit burn may be anywhere on the body. With wet or dry chemical burns, flush the burns with large amounts of water first, then cover with a dry dressing. In the case of white phosphorous burns, flush the burn with large amounts of water, then cover them with wet material or mud. For laser burns, apply a field dressing over the affected eye or eyes.

When applying a field dressing, take the following precautions:

- Do NOT place the dressing over the face or genital area.
- Do NOT break the blisters.
- Do NOT apply grease or ointments to the burns.

In all cases, seek medical assistance.

3.0.0 HEAT AND COLD INJURIES

3.1.0 Introduction

Climatic injuries are caused by extreme hot or cold environments. The human body needs time to adapt to any extremes of temperature. The Seabee's physical condition will, to some extent, determine how long it takes to become acclimated. There are other factors that contribute to an individual's health and therefore susceptibility, such as proper diet or nutrition, sufficient sleep and rest, proper exercise, and suitable clothing. While serving in extremes of climate, individuals who are trying to lose weight should be supervised by properly trained medical personnel. Most climatic injuries are preventable.

3.2.0 Heat Injuries

3.2.1 General

Sometimes the heat of the environment causes injuries that need to be treated in the field. Heat injuries are caused by exposure to extreme heat, improper clothing, wearing of Mission Oriented Protective Posture (MOPP) gear, enclose spaces, and wearing body armor. The prevention of heat exposure injuries is a command responsibility. All hands must be educated about medical dangers and environmental health in the field. There are three categories of heat injuries: heat cramps, heat exhaustion, and heatstroke.

WARNING

The heat casualty should be continually monitored for development of conditions which may require the performance of necessary basic lifesaving measures.

CAUTION

Do not use salt solutions in first aid procedures for heat injuries.

3.2.2 Heat Cramps

Heat cramps are caused by an imbalance of electrolytes in the body from excessive sweating. The signs and symptoms of heat cramps are:

- Cramping in the arms or legs
- Stomach cramps
- Excessive sweating

To treat a casualty for heat cramps, first move him or her to a cool, shady area. Loosen his or her clothing and slowly give the casualty a canteen of water. Cool water is absorbed more quickly than warm water. If the condition is unabated or continues, seek medical assistance.

3.2.3 Heat Exhaustion

Heat exhaustion is caused by a loss of fluids in the body. The signs and symptoms of heat exhaustion include the following:

- Excessive sweating
- Pale, moist, cool skin
- Headaches
- Weakness
- Dizziness
- Loss of appetite
- Cramping

- Nausea with or without vomiting
- Chills or goosebumps
- An urge to defecate
- Rapid breathing
- Tingling in the hands or feet
- Confusion

To treat for heat exhaustion, first move the casualty to a cool, shady area. Loosen or remove his or her clothing and boots. Pour water over the casualty and fan him or her, while slowly giving the casualty a canteen of water. Elevate the legs and keep the casualty from doing any strenuous activities for the rest of the day. Monitor the casualty until the symptoms are gone, or provide medical assistance.

3.2.4 Heatstroke

Heatstroke is a failure of the body's cooling mechanism. The signs and symptoms of heatstroke are:

- Red, hot, and dry skin
- Experiencing weakness, dizziness, confusion, headaches, seizures, nausea, and/or stomach pain or cramps
- Rapid and weak respiration and pulse
- Unconsciousness or sudden collapse

Use the following procedures to treat heatstroke:

- Move the casualty to a cool, shady area.
- Loosen or remove the casualty's clothing.
- Spray or pour water over him or her and fan him or her.
- Massage the extremities and skin.
- Elevate the legs.
- Slowly give the casualty a canteen of water.

This is a more severe heat injury than heat cramps or heat exhaustion, so you should seek medical assistance immediately while monitoring the casualty for necessary lifesaving measures.

3.3.0 Cold Injuries

3.3.1 General

Cold injuries are most likely to occur when it is moderately cold, but wet and/or windy. It is important to understand what to do to prevent cold injuries. First, maintain good personal hygiene; get sufficient exercise; take care of your feet and hands, and use protective clothing.

There are many contributing factors to cold injuries. Humidity, precipitation, and wind increase the likelihood of injury. Stationary activities such as standing guard increase

an individual's vulnerability, especially if that individual is in contact with the ground for extended periods or standing in water. Inadequate diet and rest increase susceptibility and lower defenses. Physical fatigue leads to apathy, neglect, and carelessness. Studies show that previous cold injuries also increase your risk. Depressed and unresponsive personnel tend to be less active. Finally, excessive use of alcohol or drugs impairs your judgment and is likely to cause carelessness or overconfidence.

Seabees may be suffering from cold injuries without knowing it. They may simply feel uncomfortable and not notice that extremities are already numb from the cold. The general signs and symptoms of cold injuries include:

- Numbness or tingling sensations, which may be relieved by simply loosening boots or clothing and exercising to rewarm yourself
- Discoloration of the skin:
    - With lighter-skinned individuals, skin becomes red, then pale or waxy white
    - With darker-skinned individuals, skin will be grayish
- Affected area may feel cold to the touch
- Swelling may occur with deeper injuries
- Blisters may occur after rewarming

You should use the buddy system to check each other for signs of cold injuries.

The treatment for cold injuries varies with the severity of the injury. First and foremost, an individual suffering any cold injury should be removed from the cold environment. With superficial injuries, you can rewarm the affected part with body heat. With more serious, life-threatening injuries you should seek medical assistance immediately.

WARNING

- Do not massage the injured part.
- Do not expose the casualty directly to fire or a stove.
- Do not rub the injured part with snow.
- Do not slap or chafe injured parts, or soak them in cold water.
- Avoid walking on injured feet if at all possible.

The primary injuries caused by cold environments are chilblain, immersion syndrome, frostbite, snow blindness, dehydration, and hypothermia.

3.3.2 Specific Cold Injuries/Conditions

3.3.2.1 Chilblain

Chilblain is caused by repeated exposure of bare skin to temperatures from 32 to 60 degrees Fahrenheit. The symptoms of chilblain are acutely swollen, red, tender, hot, or itchy skin. Treat chilblain by rewarming the affected part using firm steady pressure with your hands or by placing the affected parts under your arms or against your buddy's stomach. Do not rub or massage the affected parts. Have medical personnel evaluate you for any damage.

3.3.2.2 Immersion Syndrome

Immersion syndrome, also known as immersion foot or trench foot, results from long exposure of the feet to wet conditions in temperatures ranging from 32 to 50 degrees Fahrenheit. Inactive feet in damp or wet socks and boots are more susceptible.

The signs of immersion syndrome occur in stages with exposure. At first, the feet are cold but painless. The pulse may be weak and the feet may be somewhat numb. Next, the feet feel hot with burning or shooting pain. Later, the skin becomes pale with a bluish tint and the pulse decreases. In the later stages, the feet may blister, swell, bleed, or even become gangrenous.

Treatment is required for all stages of immersion syndrome:

- Gradually warm the affected part and protect it from trauma and infection.
- Apply dry, loose clothing or layers of warm coverings.
- Elevate the feet to reduce swelling.
- Transport the casualty to a medical facility as soon as possible.
- Do not massage the feet, moisten the skin, or apply direct heat or ice.

3.3.2.3 Frostbite

Frostbite is caused by exposure to cold temperatures, usually below 32 degrees Fahrenheit. Individuals with a history of cold injuries are more likely to get frostbite. The most easily frostbitten parts of the body are the cheeks, nose, ears, chin, forehead, wrists, hands, and feet. Deep frostbite is very serious and can result in amputation of appendages.

The signs or symptoms of frostbite include:

- Loss of sensation or numbness
- Sudden blanching of the skin, then brief tingling
- Redness of the skin or grayish in darker-skinned individuals
- Blisters, swelling or tender parts
- Loss of previous pain sensation
- Pale, yellowish, waxy-looking skin
- Frozen tissue that feels solid or wooden

Treat frostbite of the face, ears, or nose by covering them with bare hands until sensation and natural skin color returns. Place frostbitten hands under the armpits. To treat frostbitten feet, remove boots and socks and place the feet under clothing against a buddy's body.

General treatment of frostbite is as follows:

- Keep the affected parts warm and covered.
- Remove or loosen restrictive clothing.
- Cover affected parts to protect them from further injury.
- Exercise if possible to warm up.
- Seek medical treatment.
- Do not rub the injured part with snow or apply cold water.

- Do not massage.
- Do not expose to an open fire.
- Do not use ointments or salves.
- Do not manipulate the affected part to increase circulation.
- Do not use alcohol or tobacco.

3.3.2.4 Snow Blindness

Snow blindness is the effect that the glare from ice or snow has on the eyes. It is more likely to occur in hazy, cloudy weather. The signs and symptoms of snow blindness are:

- The sensation of grit in the eyes
- Pain in or over the eyes
- Eye watering or redness
- Headache
- Pain with exposure to light

To treat a casualty for snow blindness, blindfold or cover the eyes with dark cloth. Complete rest is desirable for quicker recovery. If necessary and possible, evacuate the casualty to a medical facility. Snow blindness usually heals by itself in a few days if there is no repeated exposure.

3.3.2.5 Dehydration

Dehydration occurs when the body loses too much fluid. It is just as prevalent in cold weather as in hot. In colder temperatures, sweating is not as noticeable since it evaporates and is quickly absorbed.

The signs and symptoms of dehydration are:

- Mouth, tongue, throat parched or dry
- Difficulty swallowing
- Nausea, with or without vomiting
- Extreme dizziness and fainting
- General fatigue and weakness
- Muscle cramps
- Difficulty focusing the eyes

To treat for dehydration, keep the individual warm and loosen his or her clothing. Shelter the individual from the wind and cold and begin fluid replacement immediately. Transport the casualty to a medical treatment facility as soon as possible.

3.3.2.6 Hypothermia

Hypothermia, or general cooling of the body, occurs when the body loses heat faster than it can produce heat. It can occur with temperatures above or below freezing and causes cooling of the core body temperature below 95 degrees Fahrenheit. Hypothermia can be caused by fatigue, poor physical condition, dehydration, faulty blood circulation, alcohol or drug use, trauma, or immersion in cold water.

The signs and symptoms of hypothermia are progressive and include:

- Shivering
- Faint pulse
- Drowsiness and mental slowness
- Hampered, stiff, and uncoordinated movement
- Slurred speech
- Slow and shallow breathing
- Frozen extremities
- Irregular heart action

To treat mild hypothermia, rewarm the body evenly and as soon as possible. You must provide a heat source, as the casualty will be unable to produce the needed heat. Keep the casualty dry and protected from the elements. Give the casualty warm liquids gradually, if he or she is conscious. Be prepared to provide life support measures and seek medical assistance immediately.

Severe hypothermia is treated by stabilizing the body's core temperature and avoiding further heat loss. Handle the casualty gently and evacuate to a medical facility as soon as possible. Do not expose the body to an open fire. Wrap any hot water bottles or canteens in cloth to avoid scalding. Rewarming in the field is dangerous and resuscitation is difficult if not impossible in the field.

4.0.0 FIELD SANITATION

4.1.0 General Information

Field waste disposal is performed to prevent flies from spreading germs from waste to your food and to keep unwanted animals out of your bivouac area. Use the following as a guide to performing proper field waste disposal:

Step 1: Determine the type of field waste disposal to use:

- The proper type of device to use depends upon the mission, length of stay, terrain, and weather conditions, but you should use *Table 10-1* as a guideline.
- When on bivouac:
    - Chemical toilets are the preferred method.
    - Burn-out latrines are preferred as an improvised method when chemical toilets are not available.
- When on the march:
    - Individual waste collection bags are preferred.
    - Personal cat-holes are used as an alternative.

NOTE

Check local, state, federal, and host-nation regulations for applicable restrictions, and for prohibition on burning or burying waste. Garbage and rubbish may have to be transported to a waste disposal facility.

Table 10-1 — Sanitation Device Usage Guidelines

Sanitation Device	Highly Mobile	Short Bivouac	Extended Bivouac
Individual Waste Collection Bags	X	X	X
Chemical Toilets	X	X	X
Cat-Hole Latrines	X		
Straddle-Trench Latrines		X	
Deep Pit Latrines			X
Garbage		X	X
Soakage Pits (Food Service)		X	X
Mess Kit Laundry/Sanitation Center		X	X
Handwashing Devices		X	X
Showers		X	X
Urinals (Trough, Pipe, Urinoil)		X	X

Step 2: Select appropriate locations:

- Human waste disposal should be as far from food services as possible, but at least 100 meters.
- Garbage and soakage pits should be at least 30 meters from food service.
- Locate downwind and downslope if possible.
- Locate downslope of all wells, springs, streams, and other water sources, at least 30 meters.

Step 3: Set up, construct, and maintain latrines, garbage pits, and soakage pits/trenches:

- As soon as unit moves into area, detail members to set up chemical toilets and/or dig latrines
- Assign members to clean latrines on a daily basis
- Instruct the Field Sanitation Team to spray latrines with insecticide
- Install handwashing facilities at food service and latrines
- Cover, transport, burn, or bury waste daily, depending on regulations

Step 4: Inspect daily to ensure:

- Waste is collected and transported when possible
- Straddle-trench latrines and garbage pits are covered with dirt
- Pail latrines are emptied and cleaned
- Burn-out latrine containers are rotated and contents burned
- Facility, not contents, are sprayed with insecticide as needed

Step 5: Close out improvised latrines and garbage pits when filled within 1 foot of surface by:

- Spraying with residual insecticide
- Packing earth in successive 3-inch layers until mounded one foot above surface
- Spraying again with insecticide

- Posting a sign saying “Closed latrine/garbage pit and date.” (except in combat)

4.2.0 Waste Disposal Devices

Individual Waste Collection Bags:

- Preferred method when on a march
- Dispose of with regular waste

Chemical Toilets:

- Preferred method on bivouac
- Add urinals to protect seats

Cat-hole Latrines (*Figure 10-30*):

- Alternate on-the-march method when bags not available
- Cover immediately after use
- Dig 6 to 12 inches deep and 12 inches in diameter
- Keep mound of dirt removed to fill in hole

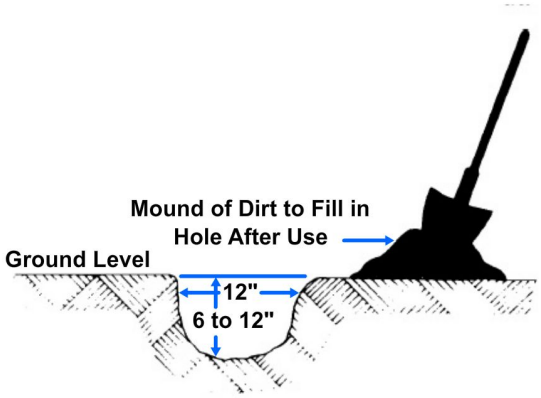


Figure 10-30 – Cat-hole Latrine

Straddle-trench Latrine (*Figure 10-31*):

- Use on short bivouacs and field training exercises
- Two trenches per 100 males, three per 100 females
- Dig 4 feet by 1 foot, 2 ½ feet deep, 2 feet apart
- Keep mounds of dirt removed to fill hole after use
- Cover with dirt daily

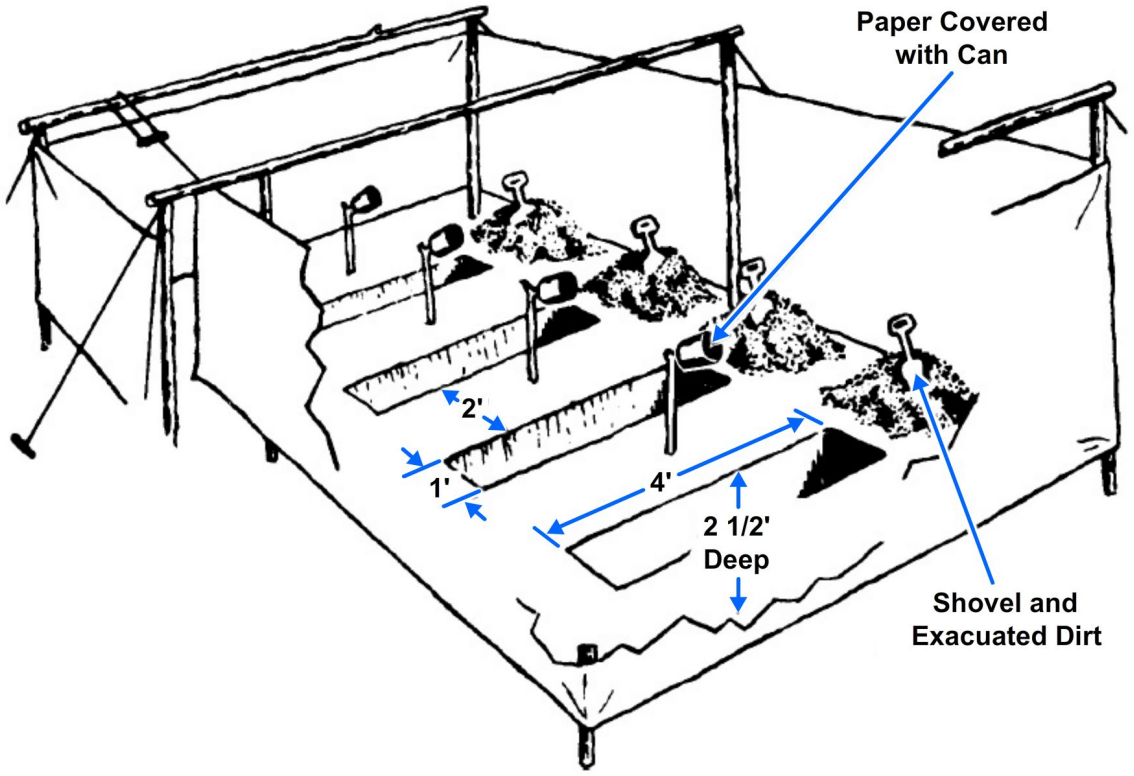


Figure 10-31 – Straddle-trench Latrine.

Deep Pit Latrine (*Figure 10-32*):

- Use for longer periods and built-up areas
- Collapsible two-seat boxes available in supply system
- Add urinals to protect seats in male latrines
- Enough for 6 percent of Seabees
- Cover with dirt daily

Garbage Pit:

- Locate near dining facility, but no closer than 30 meters
- One pit per 100 Seabees served per day
- Transport to approved landfill or cover with dirt after each meal and close daily
- For longer periods, burn and bury ashes

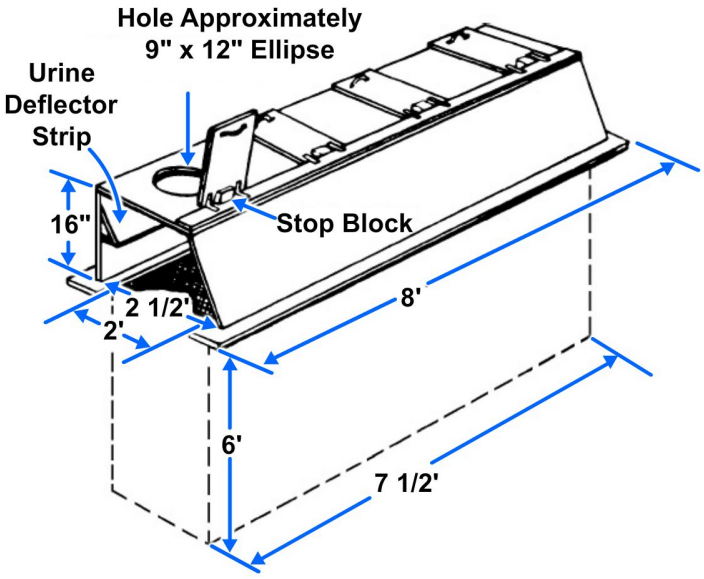


Figure 10-32 — Deep Pit Latrine.

Pail Latrine (*Figure 10-33*):

- Use where water table too close to surface for deep pit latrines
- Empty and clean daily

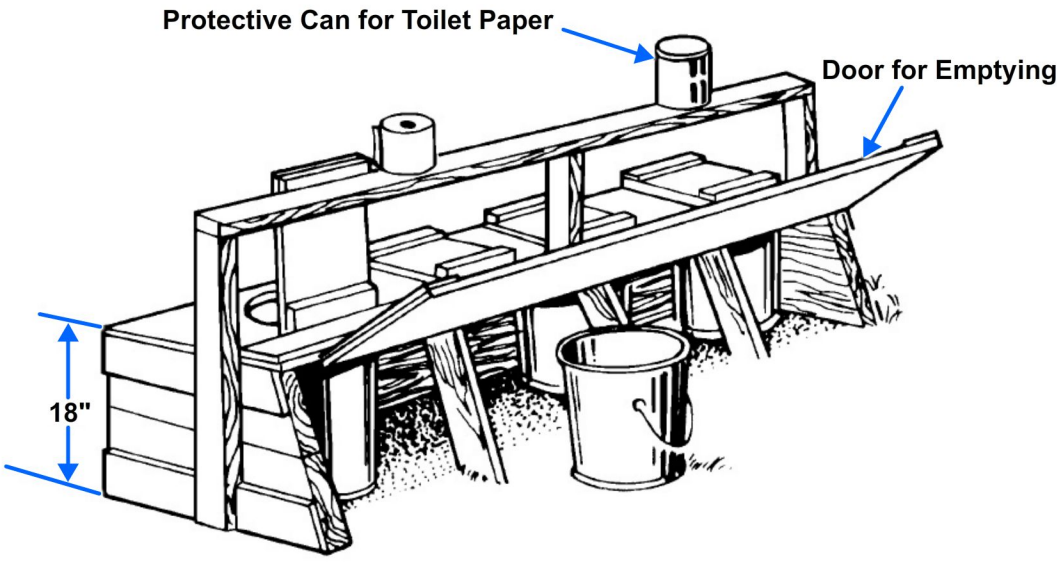


Figure 10-33 — Pail Latrine.

Grease Trap – Use with soakage pits and trenches to prevent clogging of soil

Burn-out Latrine *(Figure 10-34)*:

- Use where water table too close to surface, or extended stays
- Rotate containers daily and burn contents

Other Urinals:

- Trough *(Figure 10-35, frame A)*
- Pipe *(Figure 10-35, frame B)*
- Urinoil *(Figure 10-35, frame C)*

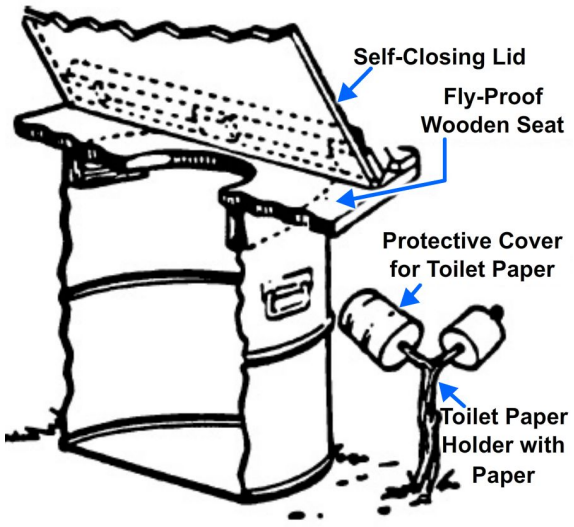
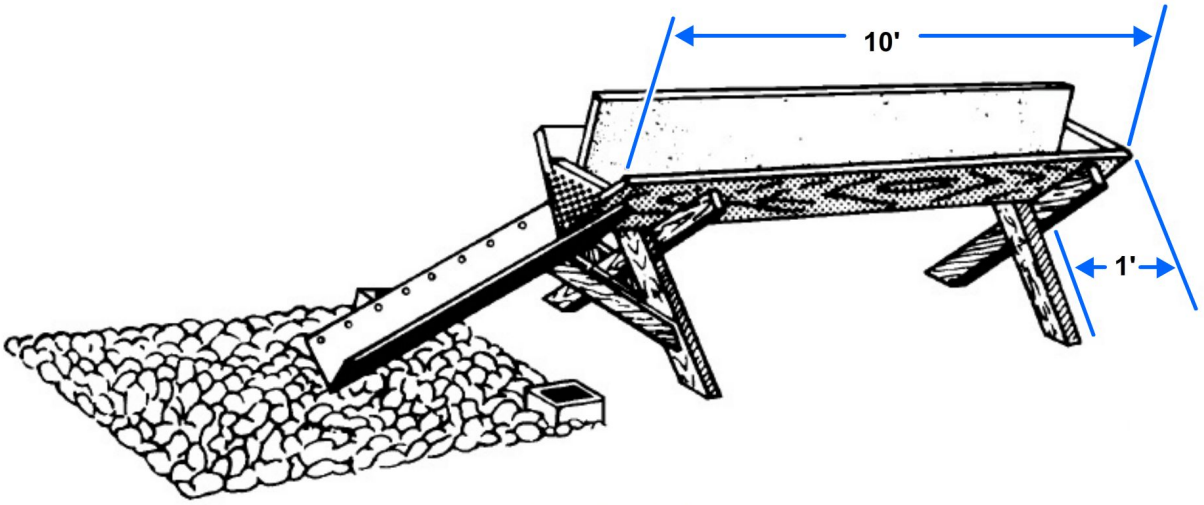


Figure 10-34 – Burn-out Latrine.



Trough Urinal

Figure 10-35 – Other urinals; Trough, Pipe, and Urinoil.

Interaction Available

Soakage Pit - Food Service (*Figure 10-36*):

- Locate near dining facility to prevent accumulation of liquid waste from kitchens
- Need at least two to alternate daily
- Fill with loose rocks
- Add grease trap for dining facility waste to prevent clogging of soil

Soakage Pit (Other):

- Provide for urinals, showers, Lyster bags, mess kits, laundry, handwashing facilities
- Prevents accumulation of liquid waste

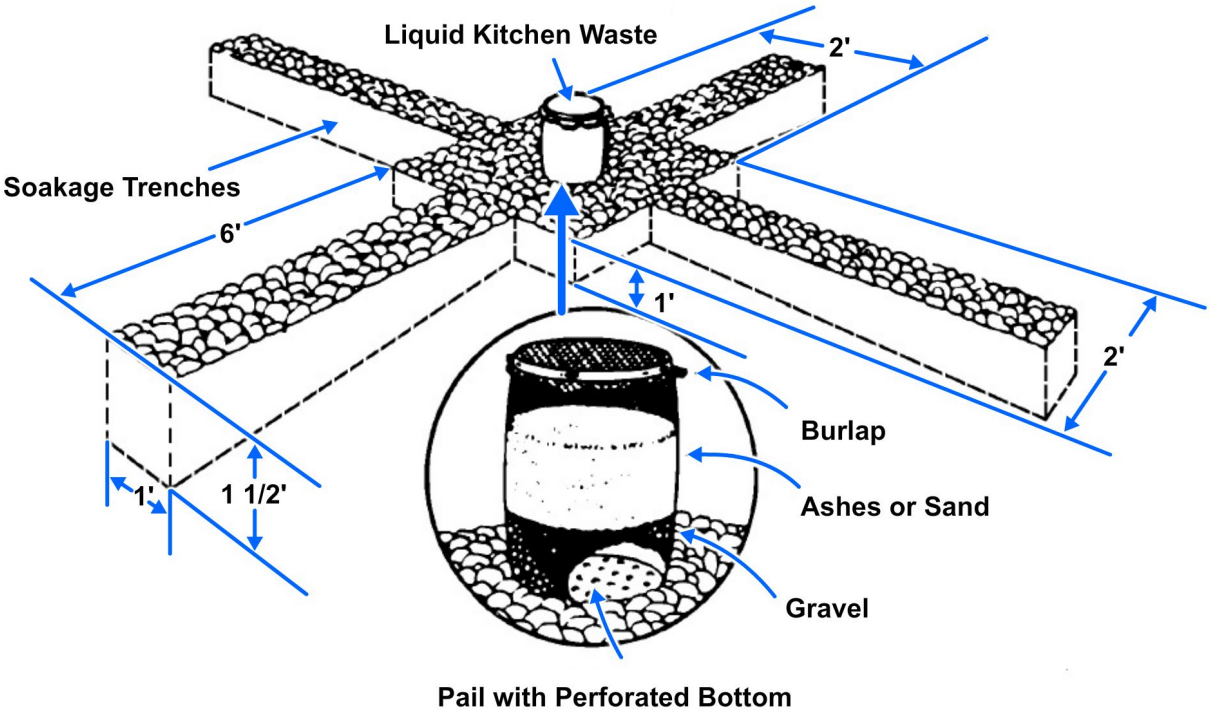


Figure 10-36 – Food Services Soakage Pit.

5.0.0 WATER PURIFICATION

5.1.0 Overview

Infectious diarrhea results from contamination of water and food by bacteria, viruses, and parasites. Water- and foodborne diarrheal diseases are of particular concern to the military because they can be spread to large numbers of service members simultaneously with disastrous consequences for combat readiness. Diarrhea, especially when vomiting or fever is present, can cause dehydration.

Fill your canteen with treated water at every chance. When treated water is not available, you must disinfect the water in your canteen using one of the following methods. Using iodine tablets is the preferred way to individually purify water.

There are several alternate techniques for making drinking water clean if iodine tablets are not available. You can use chlorine ampoules, which are small, sealed glass vials. You can also use an emergency water treatment kit with Chlor-Floc® tablets, household bleach, or boiling to purify water.

5.2.0 Water Purification Using Iodine Tablets – Preferred Method

The following are the procedures for purifying water with iodine tablets, the preferred method. There are variations depending on the amount of water you're purifying, whether it is cold or not, and whether it is cloudy or clear.

- Fill your canteen with the cleanest water available.
- Put one iodine tablet into clear water, or two iodine tablets into cold or cloudy water. If you are using two-quart canteens double those amounts. Use two tablets for clear water and four tablets for cold or cloudy water.
- Place the cap on your canteen.
- Shake canteen to dissolve tablets.
- Wait 5 minutes.
- Loosen the cap and tip the canteen over to allow leakage around the canteen threads.
- Tighten the cap and wait an additional 25 minutes before drinking.

5.3.0 Water Purification Using Chlorine Ampoules

The following are the procedures for purifying water with chlorine ampoules.

- Fill your canteen with the cleanest water available.
- Mix one ampoule of chlorine with one-half canteen cup of water.
- Stir that mixture with a clean utensil until the contents are dissolved.
- After stirring the mixture, pour one-half of a plastic canteen capful or one Nuclear Biological Chemical (NBC) canteen capful of chlorine solution into your canteen of water.
- Place the cap on your canteen and shake.
- Slightly loosen the cap and tip the canteen over to allow leakage around the threads.

- Tighten the cap and wait 30 minutes before drinking.

NOTE

By wearing gloves or wrapping the ampoule in paper or cloth, you can avoid cutting your hands when breaking open the glass ampoule.

5.4.0 Water Purification Using An Emergency Water Treatment Kit (Chlor-Floc® Tablets)

The following are the procedures for purifying water with an emergency water treatment kit with Chlor-Floc® tablets.

- Tear off the top of the plastic water treatment bag at the perforation (first time use).
- Fill the treatment bag one-half full with the cleanest water available.
- Add one tablet.
- Fold the bag tightly three times and fold the tabs in.
- Hold the bag firmly and shake until the tablet dissolves.
- Swirl for 10 seconds.
- Let the bag sit for 4 minutes.
- Swirl again for 10 seconds.
- Let the bag sit for an additional 15 minutes.
- Insert the filter pouch into the neck of the canteen.
- Pour water from bag through the filter into the canteen. Avoid pouring sediment into the filter.
- Rinse the filter with treated water after use. Always filter through the same side of the filter.
- Rinse sediment from the treatment bag and save the bag for water treatment only.

⚠ CAUTION ⚠

Do not drink from the treatment bag! The water is still contaminated and must be filtered before drinking. Drinking non filtered water may cause stomach and intestinal disorders.

5.5.0 Water Purification Using Household Bleach

The following are the procedures for purifying water with household bleach:

NOTE

Ensure bleach is unscented.

- Fill your canteen with the cleanest water possible.
- Read the label on the bleach bottle to determine the amount of available chlorine. Liquid chlorine laundry bleach usually has about 5 to 6 percent available chlorine. Based upon the strength of the household bleach, add the chlorine to the canteen as directed in *Table 10-2*.

Table 10-2 — Drops of Household Bleach to be Added to a One-Quart Canteen

AVAILABLE CHLORINE	TO CLEAR WATER	TO COLD/CLOUDY WATER
1 PERCENT	10 drops	20 drops
4-6 PERCENT	2 drops	4 drops
7-10 PERCENT	1 drop	2 drops

- Place the cap on your canteen and shake.
- Slightly loosen the cap and tip the canteen over to allow leakage around threads.
- Tighten the cap and wait 30 minutes before drinking the water.

5.6.0 Water Purification by Boiling

You may find yourself in a situation where iodine or other purification methods are not available. In this case, you can boil water using the following procedures to make it safe for drinking:

- Bring water to a rolling boil for 5 minutes.
- In an emergency, boiling water for just 15 seconds will help.
- Protect boiled water from recontamination.

CAUTION

If water is suspected of NBC contamination, do not attempt to treat. Seek a quartermaster water supply.

Summary

In this chapter you were introduced to the importance of providing first aid to an injured person and the explanation and descriptions of first aid measures that you can apply to yourself and to others before trained medical personnel arrive. This chapter provided how-to instructions in lifesaving measures to include clearing the upper airway, giving artificial ventilation, stopping bleeding, controlling shock, and protecting the wound. Additionally, this chapter discussed fundamentals of field sanitation and water purification.

Assignment 10

Objectives

1. Define first aid and identify the general first aid rules.
2. Define basic life support.
3. Recognize the signs of airway obstruction and describe the steps necessary to clear the airway.
4. Recognize and describe the steps necessary to perform artificial ventilation.
5. Describe the methods used to control bleeding.
6. Define shock and identify its signs, symptoms, and treatment.
7. Identify the cause and treatment of injuries caused by exposure to heat or cold.
8. Identify the treatment of first aid to victims of various types of burns.
9. Recognize the steps in treating and immobilizing a fracture.
10. Identify field sanitation methods used to dispose of human waste and garbage.
11. Identify the procedures taken to purify drinking water.

Questions

1. True or False. The three reasons for performing first aid are to save lives, prevent further injuries, and prevent infection?

    1. True
    2. False

2. There are how many vital functions?

    1. 1
    2. 2
    3. 3
    4. 4

3. True or False. The vital functions consist of the breathing process, respiration, and blood circulation.

    1. True
    2. False

4. Brain cells, when deprived of oxygen, will die within what period of time?

    1. 2 to 4 minutes
    2. 4 to 6 minutes
    3. 12 to 18 minutes
    4. 30 minutes to an hour

5. Respiration involves inhaling oxygen and exhaling which of the following?

    1. Carbon dioxide
    2. Hydrogen
    3. Nitrogen
    4. Sodium Chloride

6. Your airway is comprised of the nose, mouth, and which of the following?

    1. Bronchial tree
    2. Lungs
    3. Lymphatics
    4. Throat

7. Your airway is comprised of the mouth, throat, and which of the following?

    1. Bronchial tree
    2. Lungs
    3. Lymphatics
    4. Nose

8. Your airway is comprised of the nose, throat, and which of the following?

    1. Bronchial tree
    2. Lungs
    3. Lymphatics
    4. Mouth

9. The respiration process occurs how many times per minute?

    1. 4 to 6
    2. 12 to 18
    3. 28 to 40
    4. 60 to 80

10. Blood vessels include which of the following?

    1. Arteries, capillaries, and lymphatics
    2. Arteries, capillaries, and veins
    3. Arteries, lymphatics, and veins
    4. Capillaries, lymphatics, and veins

11. The circulatory system is comprised of which of the following?

    1. Blood vessels, lungs, and lymphatics
    2. Heart, arteries, and veins
    3. Heart, blood vessels, and lymphatics
    4. Heart, lungs, and blood vessels

12. The human pulse is caused by the rhythmic expansion and contraction of which of the following?

    1. Arteries
    2. Capillaries
    3. Muscles
    4. Veins

13. Which of the following is the artery at the side of the neck that can be used to detect a casualty's pulse?

    1. Carotid
    2. Femoral
    3. Posterior tibial
    4. Radial

14. Which of the following is the artery near the groin that can be used to detect a casualty's pulse?

    1. Carotid
    2. Femoral
    3. Posterior tibial
    4. Radial

15. Which of the following is the artery on the wrist that can be used to detect a casualty's pulse?

    1. Carotid
    2. Femoral
    3. Posterior tibial
    4. Radial

16. Which of the following is the artery at the ankles that can be used to detect a casualty's pulse?

    1. Carotid
    2. Femoral
    3. Posterior tibial
    4. Radial

17. The carotid artery that can be used to detect a pulse is located in which of the following places on the human body?

    1. Ankle
    2. Groin
    3. Side of the neck
    4. Wrist

18. The femoral artery that can be used to detect a pulse is located in which of the following places on the human body?

    1. Ankle
    2. Groin
    3. Side of the neck
    4. Wrist

19. The radial artery that can be used to detect a pulse is located in which of the following places on the human body?

    1. Ankle
    2. Groin
    3. Side of the neck
    4. Wrist

20. The posterior tibial artery that can be used to detect a pulse is located in which of the following places on the human body?

    1. Ankle
    2. Groin
    3. Side of the neck
    4. Wrist

21. Your first step in evaluating a casualty should be which of the following?

    1. Check for bleeding
    2. Check for breathing
    3. Check for pulse
    4. Check for responsiveness

22. If the casualty is breathing, which of the following should be your next step in evaluating a casualty?

    1. Check for bleeding
    2. Check for pulse
    3. Check for responsiveness
    4. Check for shock

23. If, when evaluating a casualty, you can not detect a pulse, what should be your next action?

    1. Check for breathing
    2. Check for responsiveness
    3. Perform rescue breathing
    4. Seek immediate medical help

24. When evaluating a casualty, if the casualty has a pulse and is breathing on their own, your next step should be which of the following?

    1. Check for bleeding
    2. Check for fractures
    3. Check for responsiveness
    4. Check for shock

25. Which of the following is a sign of shock?

    1. Hot, dry skin
    2. Slurred speech
    3. Sweaty, cool skin
    4. Tingling in hands/feet

26. Which of the following is a sign of shock?

    1. Loss of appetite
    2. Rapid breathing
    3. Tingling in hands/feet
    4. Unequal pupil size

27. A fracture with bleeding and bone protruding is known as which of the following types of fractures?

    1. Closed
    2. Open
    3. Primary
    4. Simple

28. Which of the following is a sign of a possible head injury?

    1. Nausea
    2. Rapid breathing
    3. Sweaty, cold skin
    4. Unequal pupil size

29. Which of the following is a sign of a possible head injury?

    1. Nausea
    2. Rapid breathing
    3. Slurred speech
    4. Sweaty, cold skin

30. Which of the following methods should be used to clear an obstruction from the throat of a casualty who is markedly obese?

    1. Abdominal thrust
    2. Chest thrust
    3. Head-tilt/chin-thrust
    4. Jaw-thrust

31. Which of the following methods is the preferred method of clearing an obstruction from the throat of a casualty?

    1. Abdominal thrust
    2. Chest thrust
    3. Head-tilt/chin-thrust
    4. Jaw-thrust

32. Which of the following methods should be used to clear an obstruction from the throat of a casualty in the advanced stages of pregnancy?

    1. Abdominal thrust
    2. Chest thrust
    3. Head-tilt/chin-thrust
    4. Jaw-thrust

33. Which of the following methods of clearing an obstruction from the throat of a casualty is commonly called the Heimlich Maneuver?

    1. Abdominal thrust
    2. Chest thrust
    3. Head-tilt/chin-thrust
    4. Jaw-thrust

34. When attempting to clear an obstruction from the throat of an unconscious casualty, how many times should you thrust before trying rescue breathing?

    1. 2 or 3
    2. 4 or 5
    3. 6 to 10
    4. 12 to 18

35. Which of the following methods should be used to open the airway of a casualty with a neck injury or severe head trauma?

    1. Abdominal thrust
    2. Chest thrust
    3. Head-tilt/chin-thrust
    4. Jaw-thrust

36. Which of the following is the preferred method of rescue breathing?

    1. Abdominal thrust
    2. Chest thrust
    3. Mouth-to-mouth
    4. Mouth-to-nose

37. True or False. Performing rescue breathing on a casualty who is already breathing is not harmful.

    1. True
    2. False

38. Which method of rescue breathing should be performed on a casualty whose jaws are clamped shut from spasms?

1. Abdominal thrust
2. Chest thrust
3. Mouth-to-mouth
4. Mouth-to-nose

39. When performing rescue breathing, how many breaths should you blow into their mouth or nose before checking for a pulse or re-establishing airway and seal?

1. 1
2. 2
3. 3
4. 4

40. Which of the following is a correct statement concerning treatment for bleeding?

1. Do not remove objects from the wound
2. Pressure points should be used as a last resort
3. Tails of the standard field dressing should be tied over the wound
4. You should use your field dressing first

41. Which of the following is a correct statement concerning treatment for bleeding?

1. If an object is impaled in the wound, remove it quickly
2. Remove any visible foreign objects from the wound
3. Tie the tails of the dressing at the edges of the wound
4. You should use your field dressing first

42. When using manual or direct pressure to stop bleeding, firm pressure should be applied for how many minutes?

1. 2 to 4
2. 5 to 10
3. 15 to 30
4. Until bleeding stops

43. When applying a tourniquet, which of the following statements is correct?

1. It should be applied directly over the wound
2. Loosen and retighten every 5 to 10 minutes
3. Once applied, do not loosen
4. Wire or shoestring may be used

44. A burn from a hot liquid is considered which type of burn?

1. Chemical
2. Electrical
3. Laser
4. Thermal

45. Which of the following types of burns should be kept moist?

1. Dry chemical
2. Laser
3. Wet chemical
4. White Phosphorous

46. True of False. When treating either heat exhaustion or heatstroke, you should elevate the casualty's legs.

1. True
2. False

47. Which of the following injuries is caused by an imbalance of electrolytes in the body?

1. Dehydration
2. Heat cramps
3. Heatstroke
4. Hypothermia

48. Heat exhaustion is caused by which of the following?

1. An imbalance of electrolytes in the body
2. Failure of the body's cooling mechanism
3. Loss of fluids in the body
4. Muscular stress

49. Which of the following injuries is caused by a failure of the body's cooling mechanism?

1. Heat cramps
2. Heat exhaustion
3. Heatstroke
4. Hypothermia

50. Which of the following cold injuries is swollen, red skin caused by exposure to temperatures from 32 to 60 degrees?

1. Chilblain
2. Dehydration
3. Frostbite
4. Snow blindness

51. Which of the following is caused by wet feet in temperatures between 32 and 50 degrees?

1. Chilblain
2. Dehydration
3. Frostbite
4. Immersion syndrome

52. Frozen tissue with a sold or wooden feeling are signs of the later stages of which of the following cold injuries?

    1. Chilblain
    2. Dehydration
    3. Frostbite
    4. Hypothermia

53. Difficulty swallowing and muscle cramps are signs of which of the following cold injuries?

    1. Dehydration
    2. Hypothermia
    3. Immersion syndrome
    4. Snow blindness

54. Irregular heartbeat and slurred speech are signs of which of the following cold injuries?

    1. Dehydration
    2. Frostbite
    3. Hypothermia
    4. Immersion syndrome

55. How many iodine tablets should be used to purify a quart canteen of clear water?

    1. 1
    2. 2
    3. 3
    4. 4

56. How many minutes should you wait before tightening the canteen cap when purifying water using iodine tablets?

    1. 1
    2. 2
    3. 5
    4. 10

57. When purifying water with iodine tablets, how many minutes should you wait before drinking, once you've tightened the cap?

    1. 5
    2. 10
    3. 15
    4. 25

58. How many chlorine ampoules should you add to a half canteen cup of clear water to purify it?

1. 1
2. 2
3. 3
4. 4

59. Which of the following is the preferred improvised method of human waste disposal?

1. Burn-out latrine
2. Cat-hole latrine
3. Pail latrine
4. Straddle-trench latrine

60. Which of the following human waste disposal methods should be used on patrol?

1. Burn-out
2. Cat-hole
3. Pail
4. Straddle-trench

61. When using straddle-trench latrines, how many trenches do you need for 100 females?

1. 1
2. 2
3. 3
4. 4

ASSIGNMENT 10

First Aid and Field Sanitation

Directions: Select the correct answer from the list of alternates below each question in the end of chapter assignment. Write in the answer next to the corresponding question number below. Use this answer sheet as a reference to completing the online assignment related to this assignment.

1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	
12.	
13.	
14.	
15.	
16.	
17.	
18.	
19.	
20.	
21.	

22.	
23.	
24.	
25.	
26.	
27.	
28.	
29.	
30.	
31.	
32.	
33.	
34.	
35.	
36.	
37.	
38.	
39.	
40.	
41.	
42.	

43.	
44.	
45.	
46.	
47.	
48.	
49.	
50.	
51.	
52.	
53.	
54.	
55.	
56.	
57.	
58.	
59.	
60.	
61.	

Additional Resources and References

This chapter is intended to present thorough resources for task training. The following reference works are suggested for further study. This is optional material for continued education rather than for task training.

First Aid, FM 4-25.11 (FM 21-11)/NTRP 4-02.1.1/AFMAN 44-163(I)/MCRP 3-02G

Field Hygiene and Sanitation, FM 21-10/MCRP 4-11.1D

Trainee Feedback

Center for Seabees and Facilities Engineering (CSFE) makes every effort to keep their courses up-to-date and free of technical errors. If you have a suggestion, found an error or inaccuracy, please write, FAX or email us by using the form below. Use one form for each comment and be sure to fill in the information as accurately and detailed as possible. Thank you for your assistance.

Write: CSFE
NCF Training Division (N7B)
3502 Goodspeed St.
Port Hueneme, CA 93043-4337

FAX: (805) 982-5508 / DSN 551-5508

E-mail: CSFE_CBCH@navy.mil

Trainee Feedback Form

Course: Seabee Combat Handbook, Volume ____, NAVEDTRA: _____

Course Date: _____ Chapter Number: _____ Page: _____

Paragraph: _____ Sentence: _____ Figure: _____ Frame/View: _____

Description: _____
_____
_____
_____
_____
_____

(optional) Corrective action: _____
_____
_____

(optional) Supporting reference(s): _____
_____

Your email address, if a response is requested: _____

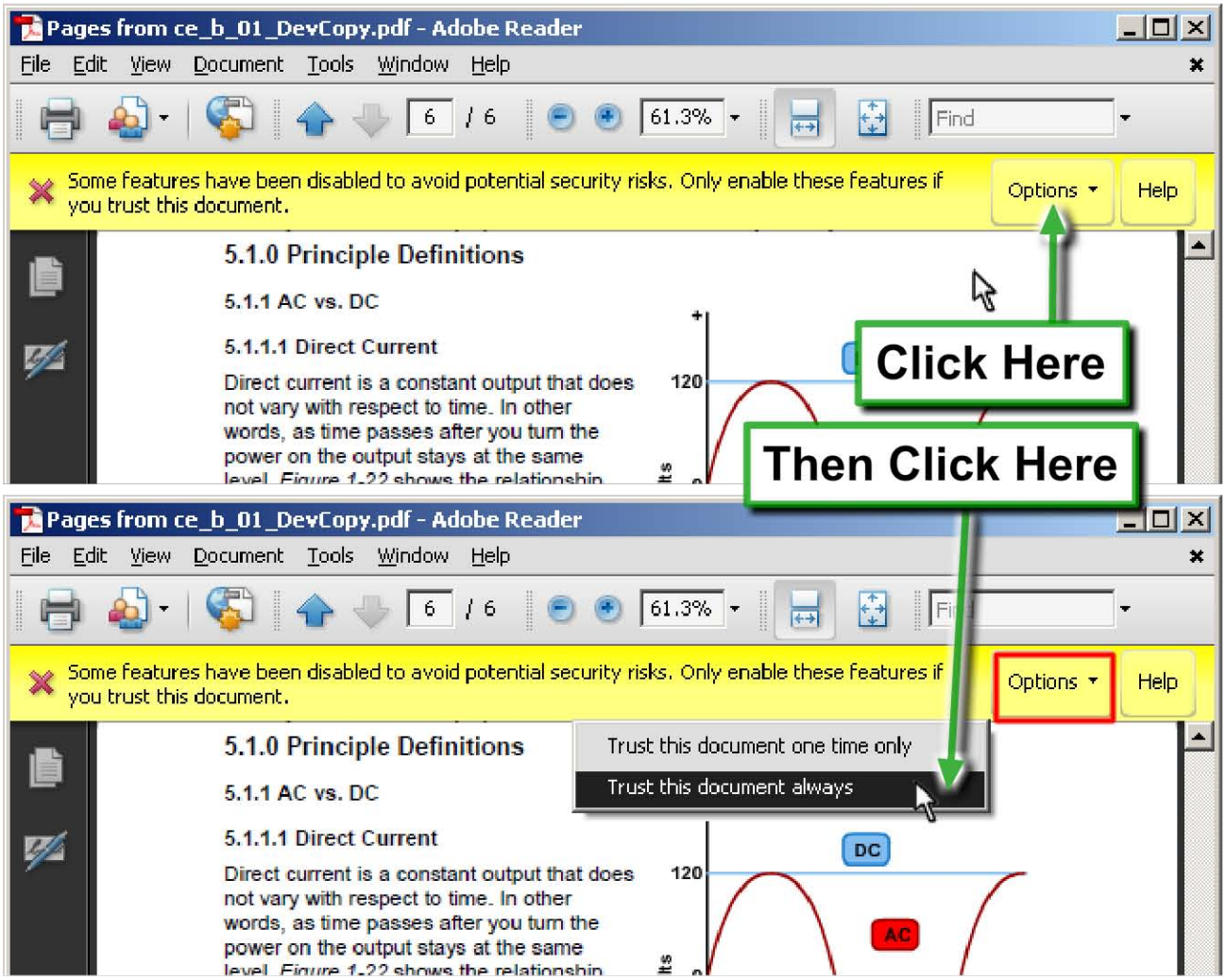
The Interactive features of this manual are currently disabled.

Many graphics will not appear correctly unless these features are turned on. You should either see a popup window, or a yellow banner at the top of the application. To enable the Interactive features of this manual follow the steps illustrated below:

If you see a popup window do the following:



If you see a yellow banner, do the following:



Once you have completed either of the above procedures the features will be enabled for this document, and this warning won't appear again after you leave this page.

Chapter 11

Small Arms Weapons

Topics

1.0.0 The M16 Service Rifle

2.0.0 The M9 Service Pistol

3.0.0 The Mossberg 500 Shotgun

4.0.0 The M203 Grenade Launcher

To hear audio, click on the icon: 

Overview

As a Seabee, you make important contributions to the activities of the Naval Construction Force (NCF). You are important as an individual as well as a Seabee. The NCF is made of individuals like you, working together as a team. The ultimate goal of the NCF is success in its construction projects as well as the defense of these projects when needed. Your job is to help achieve that success and to help provide that defense. You may have to fight alone; but most of the time, you will work and help defend a site with other Seabees under a unit or team leader. You can prepare yourself for defense by acquiring the knowledge and skills needed for using your weapons. You, as a Seabee, are likely to be required to use them.

Basic and introductory information about Seabee weapons is given so you can load, fire, field strip, and clean the M9, M16, Mossberg 500 shotgun, and the M203.

Objectives

When you have completed this chapter, you will be able to do the following:

1. Specify the correct procedures for clearing, field stripping, and firing an M16 rifle.
2. Point out the correct and safe procedures for preparing ammunition for loading and firing the M16 rifle.
3. Specify the correct procedures for clearing an M16 rifle of stoppages and the immediate action taken.
4. Point out sight adjustments and positions to an M16 rifle.
5. Describe the types and uses of M16 ammunition.
6. Define a misfire and specify the procedures to be used in the care and cleaning of an M16 rifle and its ammunition.
7. Specify procedures in cleaning, field stripping, functioning, loading, firing, and unloading the M9 service pistol.
8. Describe practices in the care and cleaning of an M9 service pistol.
9. Describe the types and uses of 9mm ammunition.

10. Specify procedures in cleaning, field stripping, functioning, loading, firing, and unloading the Mossberg 500 shotgun.
11. Specify procedures for installing an M203 grenade launcher on an M16 rifle.
12. Recognize the steps used in clearing and firing an M203 grenade launcher.
13. Describe the procedure used to correct an M203 grenade launcher misfire and define a stoppage in an M203.
14. Describe the types of ammunition used and the safety precautions to be observed when firing an M203 grenade launcher.

Prerequisites

There are no prerequisites for completing this manual.

Features of this Manual

This manual has several features which make it easy to use online.

- Figure and table numbers are italicized within the handbook text. Figure and table reference numbers are conveniently located next to (or near) the applicable handbook text.
- Audio and video clips are included in the text, with italicized instructions telling you where to click to activate the appropriate link.
- Review questions are included at the end of this chapter as the chapter assignment. To submit assignments log into https://www.courses.netc.navy.mil, go to “Student Services”, in the drop down click on “Active Courses”, go to "View/Submit Answers" next to the course you wish to submit answers for. Assignments may be submitted to the above Web site as they are completed, and instant scoring is available. Your completion letter is available as soon as you pass all assignments.
- A form at the end of each chapter allows your input for improving the manual or correcting errors to be brought to the attention of CSFE’s Technical Review Committee. Your input is important and will help keep this manual up to date and free of technical errors.

1.0.0 THE M16 SERVICE RIFLE

The M16A3 service rifle shown in *Figure 11-1,* is a 5.56mm, magazine-fed, gas-operated shoulder weapon. The design provides for either semiautomatic or automatic fire by means of a selector lever.

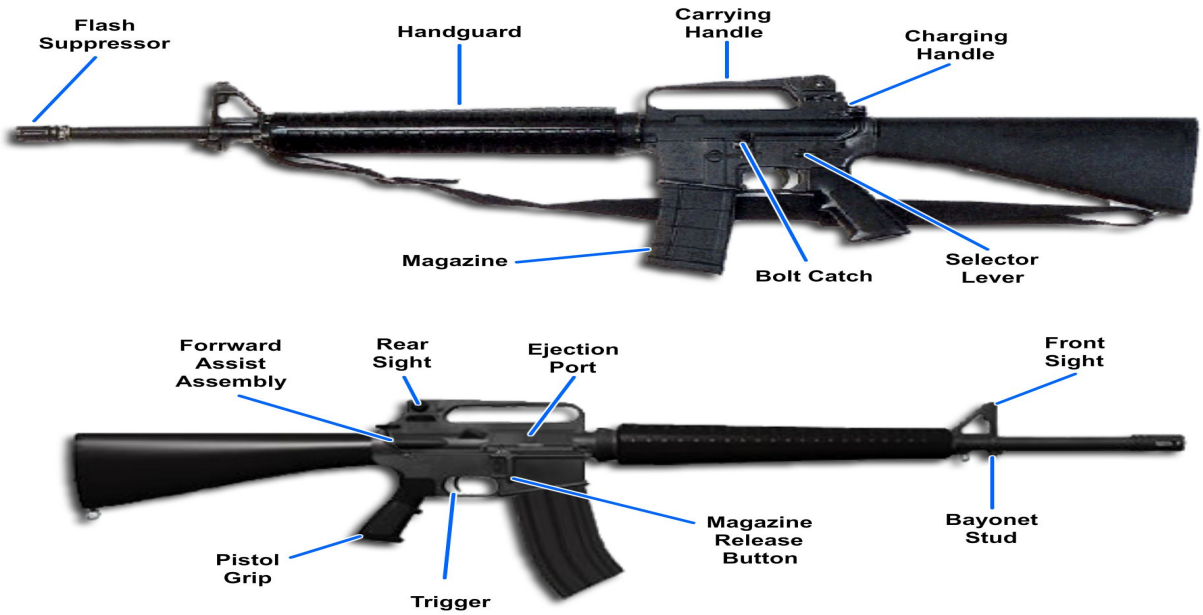


Figure 11-1 — M16 service rifle.

The M16A3 is equipped with a flash compensator to hold the muzzle down during rapid and automatic firing. This rifle also has two available magazine capacities of 20 or 30 rounds and a cyclic rate of fire of 700 to 900 rounds per minute.

The barrel of the rifle is covered by two aluminum-lined fiberglass handguards, shown in *Figure 11-2*. These handguards have notches to permit air to circulate around the barrel and to serve as protection for the gas tube. The handguards are round and ridged, making them stronger and easier to grip. The handguards are interchangeable; the handguard retaining ring is also specially contoured and easier to grip.

A forward assist assembly (*Figure 11-1*), located on the right rear of the upper receiver, permits closing of the bolt when the force of the action spring does not close the bolt.



Figure 11-2 — M16 handguards.

The trigger guard adapts easily for use in winter operations. A spring-loaded retaining pin is depressed so the trigger guard swings down along the pistol grip, allowing ready access to the trigger when cold weather mittens are being worn.

An ejection port cover prevents sand and dirt from getting into the ejection port. It should be closed during periods when firing is **NOT** anticipated and will open by either forward or rearward movement of the bolt carrier.

Left-handed shooters have some protection from injury with a built-in brass deflector located at the rear of the ejection port. The stock of the rifle is 5/8 of an inch longer, making it more comfortable and easier to handle.

For economy in communication, the following maintenance procedures (clearing, field-stripping, assembling, etc.) for the M16 service rifles are written for the right-handed Seabee. The left-handed Seabee can reverse hand directions for these procedures if it improves their efficiency.

1.1.0 Characteristics of the M16

Technical characteristics specific to the M16 and the M4A1 are listed in *Table 11-1*.

WARNING

Never mix live ammunition and dummy ammunition.

Table 11-1 — Technical Characteristics of the M16 and the M4A1

WEAPON SPECIFICATIONS	MODEL	
	M16A3	M4A1
NSN	1005-01-357-5112	1005-01-382-0953
Manufacturer	Colt Firearms	Colt Firearms
Mechanism Type	Gas operated	Gas operated
Magazine Type	Double-stacked box	Double-stacked box
Ammo Capacity	20 or 30 rounds	20 or 30 rounds
Weight (empty)	7.4 lb (3.4 kg)	6.4 lb (2.9 kg)
Overall Length	40 in (1016mm) (with suppressor)	33.0 in (838mm) buttstock open 29.75 in (756mm) buttstock closed
Barrel Length	21 in (533mm)	14.5 in (368mm)
Muzzle Velocity	3,100 fps (945 mps)	2,970 fps (905 mps)
Maximum Effective Range	601 yards (550 m)	547 yards (500 m)
Maximum Range	3,937 yards (3,600 m)	3,937 yards (3,600 m)
Caliber	5.56mm	5.56mm
Cyclic Rate of Fire (automatic)	90 rounds per minute	90 rounds per minute
Cyclic Rate of Fire (semiauto)	45 rounds per minute	45 rounds per minute
Sustained Rate of Fire	12 to 15 rounds per minute	12 to 15 rounds per minute

1.2.0 Components

The M16 has four major component groups, the upper receiver assembly, lower receiver assembly, bolt and bolt carrier group, and the magazine group assembly. The upper receiver assembly and lower receiver assembly are broken down into sub-components and described in *Table 11-2*.

Table 11-2 — Components of the M16

UPPER RECEIVER ASSEMBLY	
PART	**CHARACTERISTICS**
Handguard	Contains heat-resisting inner shields
Front Sight Assembly	Adjustable for elevation
Compensator	Prevents muzzle rise
Carrying Handle	Provides means for hand-carrying the weapon
Charging Handle	Cocks weapon
Slip Ring	Retains the handguard
Forward Assist Assembly	Ensures bolt is fully forward and locked
Rear Sight Assembly	Zeros weapon
Ejection Port	Area from which spent casing is ejected
Upper Level Swivel	Secures small arms sling
Bayonet Stud	Secures bayonet
Ejection Port Cover	Protects upper receiver from foreign matter when weapon is not in use
Barrel	Chambers the cartridge for firing and directs the projectile
LOWER RECEIVER ASSEMBLY	
PART	**CHARACTERISTICS**
Pistol Grip	Provides positive handhold
Trigger	Initiates firing sequence
Trigger Guard	Protects trigger
Magazine Catch	Retains magazine and allows operator to release magazine
Selector Lever	Selects firing mode
Bolt Catch	Holds bolt to rear after last round is fired
Takedown Pin	Used to disassemble weapon
Receiver Pivot Pin	Aids in disassembly
Buttstock	1. Contains buffer assembly 2. Adjustable for M4A1 3. Lower level swivel 4. Provides firing control and storage for basic cleaning gear

There are some subtle differences between the M16 and the M4A1; they are listed in *Table 11-3*.

Table 11-3 — Differences between the M16 and M4A1

DIFFERENCES BETWEEN MODELS					
	SPECIFICATION	**M16A1**	**M16A2**	**M16A3**	**M4A1**
Weight (w/30 rd mag)	8.79 lb (4 kg)		X	X	
	7.5 lb (3.4 kg)				X
Buttstock	Fixed	X	X	X	
	Collapsible				X
Muzzle Velocity	3,100 fps (945 mps)	X	X	X	
	2,970 fps (905 mps)				X
Barrel Length	21.0 in (533mm)	X	X	X	
	14.5 in (368mm)				X
Firing Modes	Semiautomatic	X	X	X	X
	Burst (3 round)		X	X	X
	Automatic	X		X	X
Maximum Effective Range (point target)	503 yards (460 m)	X			
	547 yards (500 m)				X
	601 yards (550 m)		X	X	X

1.2.1 Sights of the Rifle

The sights of the rifle are adjustable for both windage and elevation. Windage adjustments are made on the rear sight; elevation adjustments are made on the front sight.

The rear sight consists of two apertures, as shown in *Figure 11-3, frame 1*, and a windage drum with a spring-loaded detent, as shown in *Figure 11-3, frame 2*. The aperture marked “L” is for use for ranges beyond 300 yards (275 m); and the unmarked aperture is for use for ranges from 0 to 300 yards (0 to 275 m). Adjustments for windage are made by pressing in on the spring-loaded stud with either a pointed instrument or the tip of a cartridge and rotating the windage drum in the desired direction.

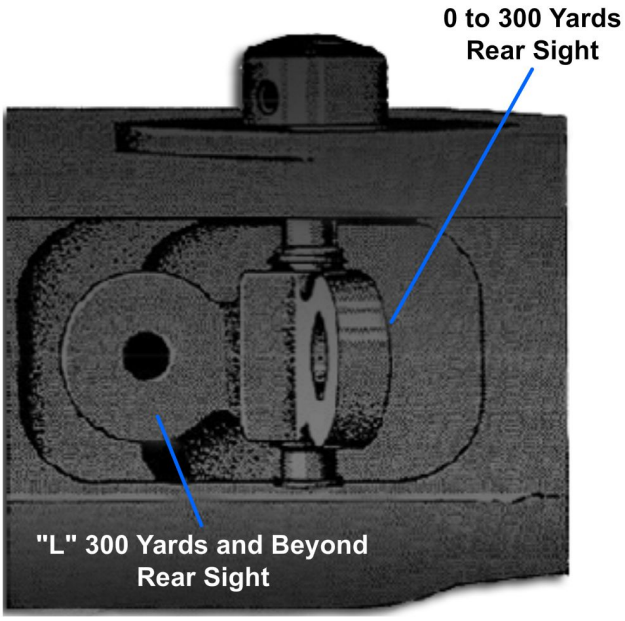


Figure 11-3 — Sights of the rifle.

The front sight of the M16 rifle consists of a rotating sight post with a spring-loaded stud (*Figure 11-3, frame 3*). Adjustments are made by using a pointed instrument or a tip of a cartridge. To raise or lower the front sight post, depress the spring-loaded stud and rotate the post in the desired direction of change. A spring-loaded detent keeps the post from being moved accidentally. To raise the strike of the bullet, depress the detent and rotate the sight post clockwise.

Interaction Available

1.3.0 Cycle of Operation

It is important to understand the routine cycle of operation to ensure the M16 is readily available for action. There are eight steps in the cycle of operation of the M16 as shown in *Table 11-4*.

Table 11-4 — Routine Cycle of Operation for the M16

STEP	ACTION
Feeding	Expansion of action spring sending buffer assembly and bolt carrier group forward with enough force to strip new round from magazine
Chambering	Pushing of the round into the chamber by the face of the bolt
Locking	Alignment of the locking lugs on the bolt with the lugs on the barrel extension
Firing	Ignition of the propellant within the cartridge case, which forces the projectile out of the barrel
Unlocking	Rotation of the bolt until the locking lugs no longer align with the lugs on the barrel extension
Extracting	Withdrawal of the cartridge case from the chamber by the extractor
Ejecting	Expulsion of the cartridge case by the ejector and spring
Cocking	Rearward movement of bolt carrier overrides hammer, forcing hammer down into receiver and compressing hammer spring, cocking hammer in firing position

1.4.0 Weapon Condition Codes for the M16

The safety status of the M16 is defined by one of four weapon condition codes. Weapon condition codes applicable to the M16 are listed in *Table 11-5*.

Table 11-5 — Weapon Condition Codes for the M16

CONDITION	ACTION
1	Safety on, magazine inserted, round in chamber, bolt forward
2	Not applicable
3	Safety on, magazine inserted, chamber empty, bolt forward, ejection port cover closed
4	Safety on, magazine removed, chamber empty, bolt forward, ejection port cover closed

⚠ CAUTION ⚠

The selector must be on SAFE to prevent damage to the automatic sear during assembly and disassembly.

1.5.0 General Disassembly (Field-Stripping)

The individual Seabee is authorized to disassemble the rifle to the extent termed field-stripping. Field-stripping is done without supervision and is adequate for normal maintenance. As the weapon is disassembled, lay out the parts on a table or other clean surface in the order of removal from left to right. This makes reassembly easier because you can assemble the parts in the reverse order of disassembly.

The steps in field-stripping are as follows:

1. Remove the sling, and place the rifle on a table or flat surface.
2. Turn the weapon on its side maintaining muzzle awareness. Press in on the takedown pin shown in *Figure 11-4,* until the upper receiver swings free of the lower receiver.

⚠ CAUTION ⚠

The takedown pin does not come out of the receiver.



Figure 11-4 — Takedown pin.

3. Press out the receiver pivot pin. Separate the upper and lower receiver groups as shown in *Figure 11-5,* and place the lower receiver group on the table.

⚠ CAUTION ⚠

The receiver pivot pin does not come out of the receiver.



Figure 11-5 — Receiver pivot pin.

4. Pick up the upper receiver group, keeping the muzzle to the left. Grasp the charging handle; press in on the latch and pull it to the rear to remove the bolt carrier from the receiver. Grasp the bolt carrier and pull it from the receiver as shown in *Figure 11-6*, *frame 1*. When the bolt carrier is removed, the charging handle falls free of its groove in the receiver as shown in *Figure 11-6*, *frame 2*. Place the receiver on the table.

5. While holding the bolt carrier group, (*Figure 11-7*, *frame 1),* press out the firing pin retaining pin (*Figure 11-7, frame 2)* to disassemble the bolt carrier group. Elevate the front of the bolt carrier, and allow the firing pin to drop from its well in the bolt as shown in *Figure 11-7, frame 3*. Rotate the bolt until the cam pin is clear of the bolt carrier key (*Figure 11-7, frame 4)*. Remove the cam pin by rotating it 90 degrees (one-quarter turn clockwise) and lifting it out of the well in the bolt and bolt carrier. After the cam pin is removed, the bolt can easily be removed from its recess in the bolt carrier as shown in *Figure 11-7, frame 5*. Remove the extractor by first pushing the extractor pin out with the firing pin. Then, while maintaining pressure on the rear portion of the extractor with your index finger, withdraw the firing pin from the extractor pinhole. Release the pressure from the extractor and remove. The extractor should be disassembled



Figure 11-6 — Removing the bolt carrier and charging handle.

Interaction Available

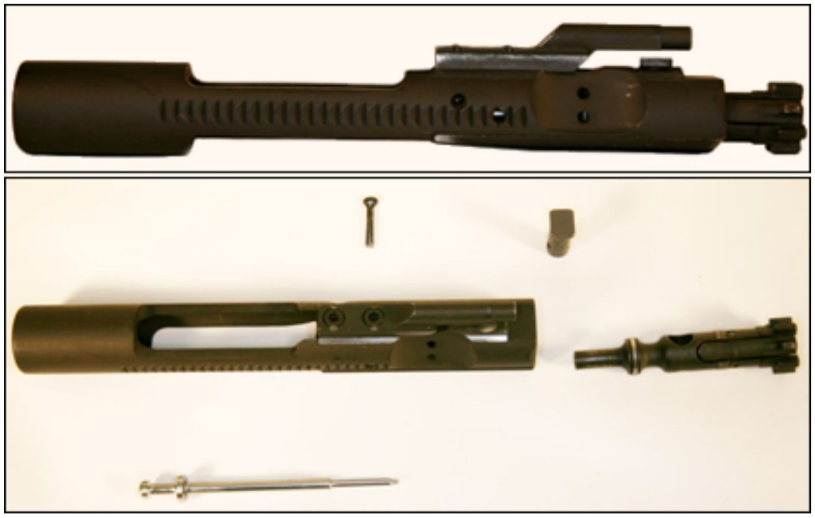


Figure 11-7 — Disassembling the bolt group.

Interaction Available

only when necessary for cleaning. Disassembly of the extractor should be supervised. Since the extractor pin is quite small, handle it with care to prevent loss or damage.

NOTE

DO NOT remove the extractor spring from the extractor. If the spring falls out of its recess, the battalion armorer should replace it.

6. Push in on the buffer assembly, using the index finger of the left hand. With the nose of a cartridge (or some similar object), push down on the buffer retainer as shown in *Figure 11-8, frame 1*. To remove the buffer assembly, press the hammer downward past the cocked position. After the body of the buffer assembly has cleared the hammer, you can withdraw the action spring from the lower receiver as shown in *Figure 11-8, frame 2.*

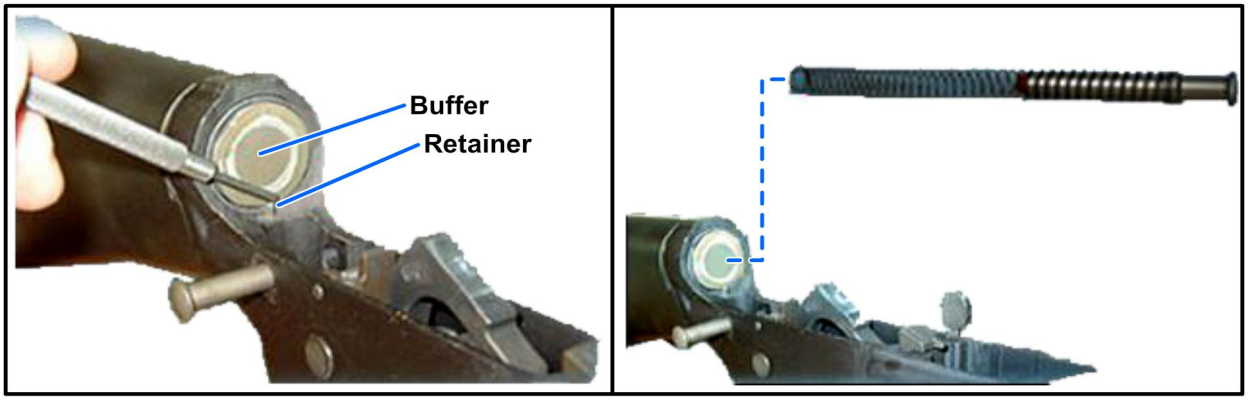


Figure 11-8 — Removing buffer assembly.

NOTE

The action spring is under pressure; therefore, take care when you are removing it. Step 6 should be performed only when absolutely necessary for care and cleaning.

Figure 11-9 shows the M16 service rifle field-stripped after you complete the above steps.

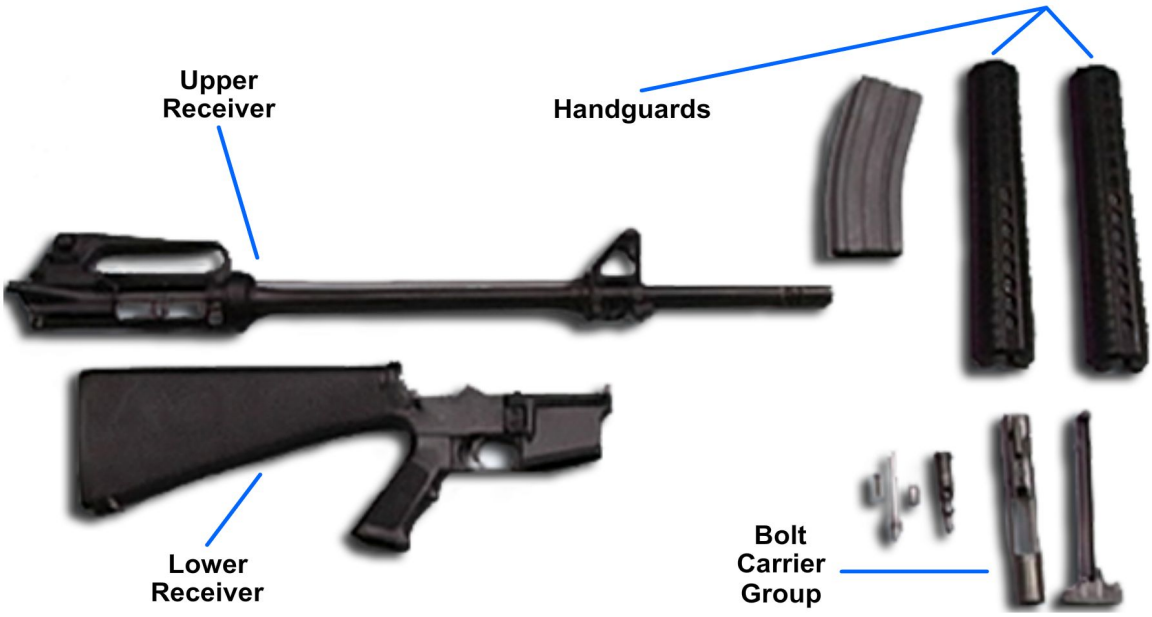


Figure 11-9 — M16 field-stripped.

1.6.0 Assembly of the Rifle

To assemble the rifle, reverse the procedures of disassembly.

1. Insert the end of the assembly spring into the lower receiver extension; depress the cocked hammer to allow passage of the buffer assembly; depress the buffer retainer with the nose of a cartridge or the tip of the firing pin; seat the buffer assembly; and then release the buffer retainer.
2. Assemble the bolt carrier group by grasping the bolt and the extractor with the action spring. Seat the extractor in the extractor recess; apply pressure on the extractor to align the pinhole; and then insert the extractor pin. Pick up the bolt carrier with the carrier key up and to the front; insert the bolt into the front of the bolt carrier, ensuring that the ejector is down and to the left. Replace the cam pin into its well, and rotate the cam pin 90 degrees (one-quarter turn) to align the holes for the firing pin in the bolt and the cam pin. Grasp the lugged rim of the bolt, and turn it until the cam pin is directly under the bolt carrier key. Insert the firing pin through the open end of the bolt carrier and seat it fully. Insert the firing pin retaining pin (if resistance is encountered, rotate the pin while inserting it).

⚠ CAUTION ⚠

DO NOT attempt to spread the slotted end of the firing pin retaining pin. Check for proper assembly by elevating the front of the bolt. If the firing pin drops out, the firing pin retaining pin is not between the front and rear spool. This means the bolt carrier group is improperly assembled.

3. Grasp the upper receiver with the carrying handle up. Place the charging handle into the groove in the top of the upper receiver. The lugs on the charging handle must be seated in their grooves in the receiver. Place the bolt carrier group into the open end of the receiver, ensuring that the bolt carrier key is in the slot on the underside of the charging handle and the bolt is forward in the unlock position. Push forward on the bolt carrier group and charging handle until it is fully seated.
4. Place the upper receiver group and lower receiver group together, and reseat the receiver pivot pin.
5. With the hammer cocked and the selector lever on SAFE, close the weapon and seat the takedown pin.
6. Replace the handguards, and be sure that the slip ring is fully seated on the lower lip of both sections of the handguards. Take care to prevent damage to the upper and lower lips and to ensure proper seating.
7. A complete functional check of the rifle consists of checking the operation of the weapon while the selector is in the SAFE, SEMI, and AUTO positions. Use the following sequence for a rapid, complete check. You may use any portion of the check alone to determine the operational condition of any specific fire selection.
    a. SAFE position – Pull the trigger; the hammer should not fall.
    b. SEMI position – Pull the trigger; the hammer should fall. Hold the trigger to the rear, recock the hammer, and release the trigger. The hammer should transfer from hammer hooks, disconnect to the hammer, and sear engagement.
    c. AUTO position – Pull the trigger; the hammer should fall. Hold the trigger to the rear, and recock the hammer. The hammer is now under the automatic sear. Still holding the trigger to the rear, push forward on the automatic sear. The hammer should frill. Still holding the trigger to the rear, recock the hammer, release the trigger, and push forward on the automatic sear. The hammer should transfer to the sear engagement. Move the selector lever to SAFE or SEMI position. Close the receivers and engage the takedown pin.

CAUTION

If the selector lever is not moved to the SAFE or SEMI position before you close the receivers, you can damage the automatic sear.

    d. SEMI position – Pull the charging handle to the rear. Make certain the chamber is clear; then release the charging handle. Pull the trigger. The hammer should fall.

1.7.0 Loading the Magazine

The magazine has a capacity of either 20 or 30 rounds and may be loaded with any amount up to that capacity. The magazine follower has a raised portion generally resembling the outline of a cartridge. Cartridges are loaded into the magazine so the tips of the bullets point in the same direction as the raised portion of the follower as shown in *Figure 11-10.*



Figure 11-10 — Loading the magazine.

⚠ CAUTION ⚠

DO NOT overload the magazine. Overloading deforms the lips of the magazine and causes malfunctions.

1.8.0 Loading the Rifle

To load the rifle, place the selector lever on SAFE as shown in *Figure 11-11*. Notice that you cannot place the selector lever on SAFE unless the rifle is cocked. You may insert the magazine with the bolt and bolt carrier open or closed; however, you should learn to load with the bolt open. This reduces the possibility of first-round stoppage and saves the time needed to pull the charging handle to the rear.



Figure 11-11 — M16 on SAFE.

Hold the stock of the rifle under your right arm with your right hand. Grasp the pistol grip; then point the muzzle in a safe direction. With your left hand, insert the loaded magazine into the magazine housing. Push upward until the magazine catch engages and holds the magazine. Rap the base of the magazine sharply with the heel of your hand to ensure positive retention. If the action is open, release the bolt by depressing the upper portion of the bolt catch with the thumb of your left hand, allowing the action to close, chambering the round. If the action is closed when the magazine is inserted, pull the charging handle fully to the rear with your right hand and release it.

NOTE

DO NOT “ride” the charging handle forward with the right hand. If the charging handle is eased forward from the open position, the bolt may fail to lock if the bolt fails to go fully forward; use the bolt closure forward assist assembly with the heel of your right hand. The rifle is now loaded and is ready to fire when you place the selector lever in the automatic or semiautomatic position. If it is not ready to fire, make sure the selector lever is on SAFE.

After the last round has been fired, the bolt catch holds the bolt carrier to the rear. To change the magazine for reloading, press the magazine catch button; remove the empty magazine from the weapon.

1.9.0 Firing the Rifle

The rifle fires semiautomatically or automatically when you move the selector lever to the desired position. With the selector lever in the semiautomatic position, the rifle fires one round each time you pull the trigger. With the selector lever in the automatic position, the rifle continues to fire until the magazine is empty or you release the trigger. When the last round from the magazine has been fired, the bolt locks in the open position.

1.10.0 Unloading the Rifle

To unload the rifle and make it safe, place the selector lever on the SAFE position (*Figure 11-12, frame 1*); and remove the magazine by pressing the magazine catch button (*Figure 11-12, frame 2*). Pull the charging handle to the rear (*Figure 11-12, frame 3*), ejecting any round from the chamber. Inspect the chamber and receiver to ensure that it is clear as shown in *Figure 11-12, frame 4*. Releasing the charging handle will allow the bolt to close. To keep the bolt open, depress the lower portion of the bolt catch before returning the charging handle forward (*Figure 11-12, frame 3*). The rifle is clear only when no case or round is in the chamber, the magazine is out, the bolt carrier is to the rear, and the selector lever is on the SAFE position. To allow the bolt to go forward, press the upper portion of the bolt catch as shown in *Figure 11-12, frame 5*.

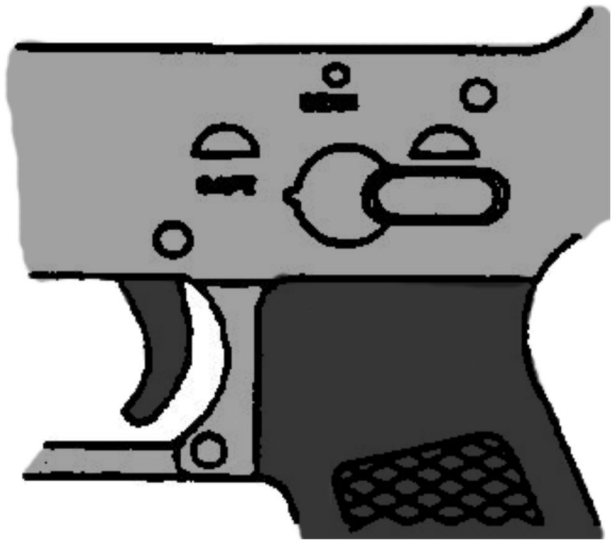


Figure 11-12 — Unloading and showing clear.

Interaction Available

1.11.0 Unloading the Magazine

To prevent damage to the lips of the magazine, remove the ammunition in the following manner:

1. Hold the magazine in your left hand with the open end away from your body and with the nose of the cartridge down as shown in *Figure 11-13, frame 1.*
2. Depress the center of the second round in the magazine using the nose of the cartridge, allowing the first round to drop out of the magazine as shown in *Figure 11-13, frame 2*. Repeat this procedure until you remove all the rounds from the magazine except the last one.



A

Figure 11-13 — Unloading the magazine.

3. Use the nose of the cartridge to depress the follower to remove the last round, allowing the last round to drop out of the magazine as shown in *Figure 11-13, frame 3*.

1.12.0 Malfunction, Stoppage, and Immediate Action

Malfunction is an unplanned cessation of fire. A malfunction occurs because of a stoppage caused by a mechanical failure of the weapon, magazine, or ammunition.

A stoppage is any interruption in the cycle of functioning caused by faulty action of the weapon or faulty ammunition. To correct this problem, you should replace either the worn or broken part or the ammunition.

Immediate action is the action you take to correct the stoppage without analyzing the cause. Immediate action to clear a stoppage in the rifle is as follows:

- Slap up on bottom of the magazine.
- Pull the charging handle to the rear.
- Observe for an ejection of the round.
- Release the charging handle.
- Tap the forward assist.
- Aim on target.
- Squeeze the trigger again.

NOTE

Apply immediate action only one time for a given stoppage. If the weapon still fails to fire, inspect it to determine the cause of the stoppage and take appropriate action.

Interaction Available

1.13.0 Misfire and Cookoff

These malfunctions rarely happen when you fire only authorized and properly maintained ammunition in properly maintained and operated weapons. However, you must understand the nature of each kind of malfunction as well as the proper preventive and corrective procedures in order to avoid personal injury or damage to your rifle. The following procedures for removing chambered cartridges associated with these malfunctions are given below:

1. MISFIRE – A misfire is a complete failure to fire, NOT a delay in firing that may be caused by a faulty firing mechanism or a faulty element in the propelling charge explosive train.
2. COOK OFF – A cook off is a functioning of any or all of the explosive components of a cartridge chambered in a hot weapon because of the heat from the continued firing of the weapon. When this happens, attempt to remove the cartridge before 10 seconds elapse. If a cartridge is chambered in a hot rifle and can neither be fired nor removed, keep your rifle trained in a safe direction. Then allow for a minimum of 15 minutes to lapse before taking any further corrective action.

1.14.0 Safe Weapon Handling Procedures for the M16 (Series) Rifle at the Clearing Barrel

The sole purpose of a clearing barrel is to provide a safe direction in which to point a weapon when performing any or all of the following functions: Load, Unload or Unload, Show Clear. At every duty station, written clearing barrel procedures shall be posted near the clearing barrel. The clearing barrel supervisor will read each command slowly and clearly while closely monitoring the process. The following procedures should always be followed prior to using a clearing barrel:

1. Inspect general condition of the clearing barrel.
2. Know what is behind/adjacent to the clearing barrel.
3. Clear unnecessary personnel away from the clearing barrel.

Personnel should line up at the clearing barrel and, one at a time, follow the directions described below.

1.14.1 LOAD Clearing Barrel Procedures for the M16 (Series) Rifle

On the supervisor’s command LOAD, personnel will, with trigger finger straight along the receiver and with the rifle pointed in the clearing barrel, perform the following steps to take the rifle from Condition 4 to Condition 3:

1. Attempt to place the selector lever in the safe position (weapon must be cocked before safety can be engaged).
2. Lock the bolt to the rear. Visually and physically verify that the firearm is safe and clear.
3. While maintaining the muzzle in the clearing barrel, release the bolt forward. Do not walk the bolt forward. Ensure the bolt is fully forward.
4. Ensure the selector lever is in the safe position.
5. Insert a magazine into the magazine well. Ensure the magazine is fully seated.
6. Close the ejection port cover.

1.14.2 UNLOAD Clearing Barrel Procedures for the M16 (Series) Rifle

On the supervisor's command UNLOAD, personnel will, with trigger finger straight along the receiver and with the rifle pointed in the clearing barrel, perform the following steps to take the rifle from Condition 1 or 3 to Condition 4:

1. Ensure the rifle is on safe.
2. Remove the magazine from the rifle and stow it on person.
3. Rotate the rifle so the ejection port is facing the deck.
4. Pull the charging handle and lock the bolt to the rear.
5. Put the rifle on safe if it would not go on safe earlier.
6. Ensure the magazine well and chamber are empty and no ammunition is present.
7. Release the charging handle and observe the bolt going forward on an empty chamber.
8. Close the ejection port cover.
9. Check the sights.
10. Recover, inspect, and return any ejected ammunition to the magazine. (Omit this step at night.)
11. Return the magazine to the magazine pouch and fasten the pouch.

1.15.0 Caring and Cleaning of the Rifle

A clean, properly lubricated, and maintained rifle loaded with clean ammunition will fire when needed. In order to keep the rifle in good condition, it must have care and cleaning. Under bad weather conditions, some key parts may need care and cleaning several times a day. The cleaning material used for the care of the rifle, as shown in *Figure 11-14*, is carried in the rifle stock. Special attention must be given to the following areas.



Figure 11-14 — Rifle cleaning material.

1.15.1 Barrel Bore and Chamber

After dipping a bore brush in the bore cleaner, brush from the chamber to the muzzle, using straight-through strokes. **DO NOT** reverse the brush while it is in the bore or it may jam. A jammed brush is hard to remove, and it can possibly damage the bore when you do this. After dipping the brush in bore cleaner, clean the chamber with the chamber brush. Replace the bore brush with a slotted cleaning patch tip, and push the dry patches through the bore and chamber until they come out clean. After cleaning the bore, lightly lubricate the bore and chamber to prevent corrosion and pitting, using the recommended lubricant on a patch. Lightly lubricate the lugs in the barrel extension.

1.15.2 Bolt Carrier Group

Dip the bore brush in the bore cleaner, and clean the inside of the carrier key. Dry with a pipe cleaner. Clean the locking lugs, bolt, extractor ejector, and bolt rings with the bore brush. Remove any accumulation of dirt, carbon, or oil from the firing pin and the external and internal surfaces of the bolt and bolt carrier. Be sure to wipe all parts dry; then lubricate them with the recommended lubricant.

1.15.3 Upper Receiver Group

With the bore brush or a swab coated with bore cleaner, remove the powder fouling collected on the group. Clean the protruding gas tube inside and outside. After cleaning these components, wipe them dry, and apply a light coat of the recommended lubricant.

1.15.4 Lower Receiver Group

With the bore brush or a swab coated with bore cleaner, remove dirt, carbon, and sand from the lower receiver group. Dry and apply a light coat of the recommended lubricant.

1.15.5 Ammunition Magazines

After removing all cartridges from the magazine, depress the spring steel lock band on the bottom of the magazine, using the nose of a cartridge (*Figure 11-15, frame 1*). Slide the base until it is free of the tabs, and remove it from the magazine body (*Figure 11-15, frame 2*). Remove the magazine spring and follower (*Figure 11-15, frame 3*), but do not remove the follower from the spring (*Figure 11-15, frame 4*). Clean the exterior and interior of the magazine with a dry rag or swab. Apply a light coat of the recommended lubricant to the magazine spring only; otherwise, keep the magazine dry. You assemble the magazine in reverse order and test it to ensure that the follower is free to move without binding. If the magazine and the ammunition in it get wet, be sure to wipe them dry as soon as possible. When left wet, both the magazine and the ammunition can become corroded and are dangerous to use. Remember not to use oil or grease on any cartridge. If you do this, injurious abrasives can collect in the weapon or produce excessive and hazardous chamber pressures when the weapon is fired. Whenever practical, ammunition should be stored under cover. This applies particularly to tracer ammunition.

Interaction Available



Figure 11-15 — Disassembly of the magazine.

1.16.0 Ammunition for the Rifle

The 5.56mm ammunition, as shown in *Figure 11-16*, for the M16 rifle is classified as small arms ammunition and is issued in the form of a complete round.



Figure 11-16 — M16 ammunition.

A complete round (cartridge) consists of all the components necessary to fire the weapon once; that is, projectile (bullet), propellant, and primer. Based upon the type of projectile, the ammunition for use in the rifle is classified as follows:

1. The ball cartridge, M193, is for field use and has either a green-painted tip or a non-colored tip. When shot from the rifle, its muzzle velocity is approximately 3,250 feet (991 m) per second. It has a maximum range of 3,000 yards (2,743 m), but the maximum effective range is 500 yards.
2. The tracer cartridge, M196, is used to observe fire and for incendiary effect. You can identify it by an orange- or a red-painted tip, depending on the ammunition lot number. The use of only tracer cartridges may cause deposits of the bullet-jacket material (metal fouling) to form in the bore and rifling grooves of the barrel. These tracer deposits are extremely difficult to remove and are a potential safety hazard. Therefore, when tracer ammunition is fired in the M16 rifle, you should mix it with ball ammunition in a ratio of no less than four ball rounds to each tracer round.
3. The dummy cartridge, M199, cannot be fired. You can identify it by six lengthwise ridges in the case. The dummy cartridge is for use in training only.
4. The blank cartridge, M200, is for use in training and ceremonial salutes. Its case mouth is closed with a rosette crimp that has a violet tip. You can identify it by the knurled band around the lower portion of the case. The grooves help identify the types of cartridges by feel when you cannot see the colored tip in the dark

2.0.0 THE M9 SERVICE PISTOL

The M9, shown in *Figure 11-17*, is the standard sidearm for the U.S. Navy. It is a magazine-fed, recoil-operated, semiautomatic, hand-held weapon. It is chambered for the 9mm ball, NATO M882 round, and can be fired in both double- and single-action modes. It has a thumb safety mounted on the slide that acts as the decocking lever. The magazine has a 15-round capacity. The M9 is a defensive weapon that is typically used at ranges of less than 50 yards (46 m).



Figure 11-17 — The M9 service pistol.

Interaction Available

2.1.0 Characteristics of the M9

Technical characteristics specific to the M9 are listed in *Table 11-6*.

Table 11-6 — Technical Characteristics of the M9

WEAPONS SPECIFICATIONS	
Model	**M9**
NSN	1005-01-118-2640
Manufacturer	Beretta, USA
Caliber	0.35 caliber (9mm)
Mechanism Type	Double-action semi auto
Magazine Type	Double-stacked box
Ammo Capacity	15 + 1 rounds
Weight (empty)	34 ounces (0.97 kg)
Overall Length	8.54 in (217mm)
Barrel Length	4.92 in (125mm)
Muzzle Velocity	1,230 fps (375 mps)
Chamber Pressure	30,000 PSI (206,843 kPa)
Single-Action Trigger Pull	4.0 to 6.4 lb (1.8 to 2.9 kg)
Double-Action Trigger Pull	9.9 to 16.1 lb (4.5 to 7.3 kg)
Maximum Effective Range	55 yards (50 m)
Maximum Range	1,967 yards (1,800 m)



Never mix live ammunition and dummy ammunition.

2.2.0 Components

The M9 has three major common components, the receiver assembly; the slide and barrel assembly; and the magazine assembly. These major components are broken down into subcomponents. The receiver assembly and the slide and barrel assembly are described in *Table 11-7*.

Table 11-7 — Common Major Components of the M9

RECEIVER ASSEMBLY	
Trigger Guard	Protects trigger
Magazine Well	Magazine insertion area
Pistol Grip	Provides handhold
Trigger	Initiates firing sequence
Hammer	Cocked by double-action trigger squeeze or by rearward movement of the slide
Magazine Catch	1. Reversible for left- or right-handed shooters 2. Retains/releases magazine
Slide Stop	1. Locks slide rearward (open) 2. Operates manually or automatically by follower when magazine is empty
Disassembly Button	1. Right side of receiver 2. Allows rotation of disassembly lever
Disassembly Lever	Rotates down, unlocking slide from receiver for disassembly
Ejector	1. Fixed 2. Ejects empty shell casings from ejection port
SLIDE AND BARREL ASSEMBLY	
Slide	1. Serrated for manual retraction 2. Cocks hammer during rearward movement
Firing Pin Assembly	1. Striker 2. Firing pin
Extractor (loaded chamber indicator)	1. Hooks over cartridge case extraction groove 2. Pulls round rearward 3. Gives indication of round in chamber 4. Red top edge 5. Protrudes on right side of slide and can be felt
Decocking/Safety Lever	1. Up position (red dot shows) FIRE 2. Down position DECOCK/SAFE 3. Moving to DECOCK/SAFE drops hammer without discharging weapon 4. Rotates firing pin striker from any contact with hammer and out of path of firing pin
Fixed Sights	1. Front: blade type 2. Rear: notched bar dovetail type
Firing Pin Block	1. Sits in firing pin notch to prevent forward movement of firing pin 2. Prevents firing pin from moving forward until trigger is squeezed
Barrel (rear of barrel is chamber/loading ramp)	The barrel assembly houses the round for firing, directs the projectile, and locks the barrel in position during firing
Recoil Spring	1. Absorbs recoil 2. Returns slide forward
Recoil Spring Guide	Keeps recoil spring straight and properly positioned
Locking Block	Locks barrel in position during firing
Locking Block Plunger	Releases barrel assembly from slide assembly

2.3.0 Cycle of Operation

It is important to understand the routine cycle of operation to ensure the M9 is readily available for action. There are eight steps in the cycle of operation of the M9 as shown in *Table 11-8*.

Table 11-8 — Routine Cycle of Operation for the M9

STEP	ACTION
Feeding	Stripping of a round from the magazine by the face of the slide
Chambering	Pushing of the round into the chamber by the face of the slide
Locking	Locking block lugs move into locking block recesses on the right and left side of the slide
Firing	Ignition of the propellant within the cartridge case, which forces the projectile out of the barrel
Unlocking	As slide assembly moves to the rear, the locking block rotates out of the notches in the slide, allowing the slide to continue rearward
Extracting	Withdrawal of the cartridge case from the chamber by the extractor claw
Ejecting	Cartridge case contacts the ejector and is knocked up and out of the slide's ejection port
Cocking	Rearward movement of the slide overrides the hammer and forces the hammer into its most rearward position

2.4.0 Weapon Condition Codes for the M9

The safety status of the M9 is defined by one of four weapon condition codes. Weapon condition codes applicable to the M9 are listed in *Table 11-9*.

Table 11-9 — Weapon Condition Codes for the M9

CONDITION	ACTION
1	Magazine inserted, round in chamber, slide forward, safety on
2	Not applicable
3	Magazine inserted, chamber empty, slide forward, safety on
4	Magazine removed, chamber empty, slide forward, safety on

2.5.0 General Disassembly (Field Stripping)

Disassembly of the M9 pistol beyond field strip (operator) level is **NOT** authorized. Below are the steps to follow when field stripping the M9 (*Figure 11-17, frame 1*):

1. Clear/unload the pistol.
2. Allow slide to return fully forward.
3. Hold pistol in the right hand with the muzzle slightly elevated. With forefinger, press disassembly lever release button as shown in *Figure 11-17, frame 2*, and with thumb, rotate disassembly lever downward until it stops as shown in *Figure 11-17, frame 3*.
4. Pull the slide and barrel assembly forward and remove as shown in *Figure 11-17, frame 4.*

WARNING

Use care when removing recoil spring and spring guide. Due to the amount of compression, assembly will be released under spring tension and could cause possible injury to personnel, or become damaged or lost.

5. Slightly compress the recoil spring and spring guide (*Figure 11-17, frame 5*) while at the same time lifting and removing the recoil spring and spring guide as shown in *Figure 11-17, frame 5*. Allow the recoil spring to stretch slowly.
6. Separate the recoil spring from the spring guide.
7. Push in on locking block plunger while pushing barrel forward slightly (*Figure 11-17, frame 6*). Lift and remove the locking block and barrel assembly from the slide (*Figure 11-17, frame 7*).

Use the following steps to disassemble the magazine:

1. Unload the magazine.
2. Grasp the magazine firmly with the floorplate up and the back of the magazine tube against the palm of your hand as shown in *Figure 11-18, frame 1*.

NOTE

To remove the floorplate, either use the tip of the 9mm round or the barrel locking block plunger. By depressing the locking block, the locking block plunger will protrude and can be used to assist in removal of the floorplate.



Figure 11-18 — M9 magazine disassembly.

3. Release the floorplate by pushing down on the floorplate retainer stud in the center of the floorplate. At the same time, slide the floorplate forward for a short distance using the thumb as shown in *Figure 11-18, frame 2*.

CAUTION

The magazine spring is under slight tension. Use care when removing the magazine floorplate.

4. While maintaining the magazine spring pressure with the thumb, remove the floorplate from the magazine.
5. Remove the floorplate retainer, magazine spring, and follower from the magazine tube. Remove floorplate retainer from magazine spring (*Figure 11-18, frame 3*).

Interaction Available

NOTE

Disassembly of the M9 pistol beyond field strip (operator) level is not authorized. If faults are found during inspection that canot be corrected, evacuate pistol to organizational maintenance/next authorized repair level.

2.6.0 M9 Assembly

Once disassembly and cleaning has been accomplished, the M9 is ready for assembly. To acomplish this, follow the steps below:

1. Grasp the slide assembly with the bottom facing up. With the other hand, grasp the barrel assembly with the locking block facing up (*Figure 11-19, frame 1*).

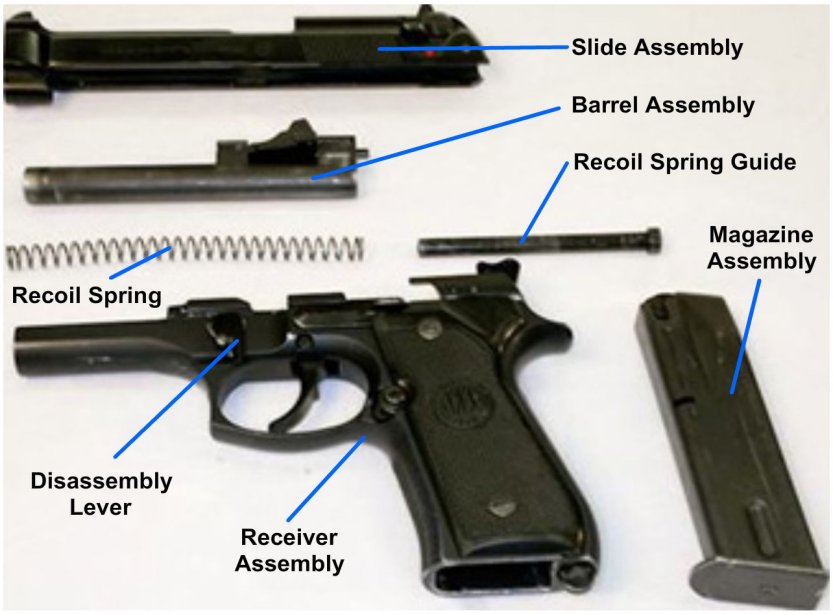


Figure 11-19 — M9 assembly.

2. Insert the muzzle of the barrel assembly into the forward open end of the slide. At the same time, lower the rear of the barrel assembly by aligning the extractor cutout with the extractor. The locking block will fall into the locked position in the slide (*Figure 11-19, frame 2)*.
3. Insert the recoil spring guide into the recoil spring (*Figure 11-19, frame 3)*.

⚠ CAUTION ⚠

During spring insertion, spring tension must be maintained until the spring guide is fully seated onto the cutaway on the locking block.

4. Insert the end of the recoil spring and recoil spring guide into slide recoil spring housing. At the same time, compress the recoil spring and lower the spring guide until fully seated onto the locking block cutaway (*Figure 11-19, frame 3*).

Interaction Available

CAUTION

Be sure hammer is uncocked and firing pin block is in the down position. If the hammer is cocked, carefully manually lower the hammer.

Do not pull the trigger while placing the slide onto the receiver.

Before reassembly, ensure the decocking/safety lever is in the safe (down) position.

5. Grasp the slide and barrel assembly, sights up, and align the slide onto the receiver assembly guide rails (*Figure 11-19, frame 4)*.
6. Push until the rear of the slide is a short distance beyond the rear of the receiver assembly and hold. At the same time, rotate the disassembly latch lever upward (*Figure 11-19, frame 5)*. A click indicates a positive lock.

NOTE

Use the following steps to reassemble the magazine (*Figure 11-20*).

7. Insert the follower into the top coil of the magazine spring. The top coil has an upward and forward pointing end. Ensure that the notches on the follower and magazine tube are on the same side.
8. Insert the magazine spring with the follower into the magazine tube.
9. Turn the magazine bottom up with the back side against the palm of your hand.
10. Attach and center the floorplate retainer to the bottom spring coil.



Figure 11-20 — M9 magazine assembly.

CAUTION

After insertion, spring tension must be maintained using your thumb.
Do not place lips of magazine tube on a hard surface during reassembly.

Interaction Available

11. Push and hold the magazine spring and floorplate retainer down. At the same time, slide the floorpate over the side walls until fully seated. This will be indicated by a click.
12. Insert the magazine into the magazine well of the pistol carefully. A click indicates the locked position.

WARNING

Before performing the following safety/function check, clear the pistol and magazine in accordance with the unloading procedures.

2.7.0 Safety/Function Checks

Before each use and after cleaning, a function test should be performed. The steps to complete this action are as follows:

1. Depress the slide stop. Insert an empty magazine into the pistol, and ensure that the magazine catch locks the magazine in place.
2. Retract the slide and release it. The magazine follower should push up on the slide stop, locking the slide to the rear.
3. Depress the magazine release button allowing the magazine to fall free.
4. Ensure the decocking/safety lever is in the safe (down) position. Depress the slide stop allowing the slide to return fully forward. At the same time, the hammer should fall to the full forward position.
5. Squeeze and release the trigger. The firing pin block should move up and down, and the hammer should not move.
6. Place the decocking/safety lever in the fire (up) position.
7. Squeeze the trigger to check double action. The hammer should cock and fall.
8. Squeeze the trigger again and hold to the rear. Manually retract and release the slide while holding the trigger to the rear. Release the trigger. A click should be heard and the hammer should not fall.
9. Squeeze the trigger to check single action. The hammer should fall.

If the above function checks perform as indicated, pistol is mission ready. If the checks do not perform as indicated, carefully return the pistol to the Armory for inspection.

2.8.0 Inherent Safety Features

The M9 has four safety features. They are the decocking/safety lever, the firing pin block, the half-cock safety notch, and the disconnector.

2.8.1 Decocking/safety lever

The safety lever permits safe operation of the pistol by both right- and left-handed shooters. As the safety is moved to the safe (down) position, the firing pin striker moves out of alignment with the firing pin. This movement prevents the pistol from firing as the hammer moves forward.

NOTE

In the fire (up) position, a red dot is visible, indicating the pistol is ready to fire.

2.8.2 Firing Pin Block

The firing pin block rests in the firing pin notch and prevents movement of the firing pin until the trigger is pulled. As the trigger is pulled, the firing pin block moves up and out of the firing pin notch. This movement allows a round to be fired when the hammer strikes the firing pin.

2.8.3 Half-Cock Safety Notch

The half-cock safety notch interrupts forward movement of the hammer during a mechanical failure. This feature prevents the hammer from following the slide forward in the event of a mechanical failure or if the trigger finger is stopped or slips off the trigger during trigger squeeze. Should one of these conditions occur, the hammer stops its forward movement at the half-cock notch and prevents the weapon from firing.

NOTE

The weapon can be fired from the half-cock position by squeezing the trigger.

2.8.4 Disconnector

The disconnector is an internal, additional safety that prevents the weapon from firing fully automatic. If the slide does not return to the full battery position due to a pistol, magazine, or ammunition malfunction, the internal link is not made between the sear and the hammer. After firing the weapon, the trigger must be released to reset the trigger and the link between the sear and hammer.

2.9.0 Loading the Magazine

Use the following steps to load the magazine:

1. Hold the magazine in one hand. With the other hand, place a cartridge on the follower in front of the lips. Press down and slide the cartridge completely back under the lips as shown in *Figure 11-21*.
2. Repeat step until the magazine is fully loaded (15 cartridges). Holes on the back side of the magazine allow for visual counting of cartridges.



Figure 11-21— M9 magazine loading.

Interaction Available

2.10.0 Loading the Pistol

WARNING

The M9 pistol incorporates single and double action modes of fire. Any time the trigger is pulled with the decocking/safety lever in the fire (up) position and a round is in the chamber, the pistol will fire from the hammer down, half cock, or full cock positions.

NOTE

The decocking/safety lever should be in the down position, which indicates the pistol is in a safe condition before loading.

To successfully load the pistol, conduct the following steps:

1. Insert the loaded magazine into the magazine well of the pistol until a click of the magazine catch is heard as shown in *Figure 11-22.* This will ensure proper catch engagement.
2. With the pistol pointing in a safe direction, grasp the serrated portion of the slide and retract the slide to the rear. Releasing the slide will strip a cartridge from the magazine and chamber it.

WARNING

The pistol is now loaded.



Figure 11-22 — Loading the pistol.

2.11.0 Firing

When ready to fire, use the following steps:

1. Release the decocking/safety lever by rotating the decocking/safety lever to the fully upward position with the thumb.

WARNING

The pistol is now ready to fire.

2. Aim the pistol at the target.
3. Fire by squeezing the trigger.

2.12.0 Unloading the Pistol

To unload the pistol, take the following actions:

1. Place decocking/safety lever in “safe” (down) position.
2. Depress the magazine release button to remove the magazine from the pistol.
3. With the pistol pointing in a safe direction, grasp the slide serrations and fully retract the slide to remove the chambered cartridge.
4. Lock the slide to the rear using the slide stop and visually inspect the chamber to ensure that it is empty.

2.13.0 Unloading the Magazine

To unload the magazine, take the following actions:

1. With one hand, hold the magazine upright with the front end forward. With the thumb, firmly press down on the cartridge rim, and push forward. As the cartridge moves forward, tip it upward end out with the index finger.
2. Repeat until the magazine is empty.

2.14.0 Malfunctions

A malfunction is a failure of the pistol to fire satisfactorily or to perform as designed. However, a malfunction does not necessarily cause an interruption in the cycle of operation. An example of a malfunction is a broken front sight. Although the front sight is an important component of the M9, it does not affect the firing function of the pistol. When a malfunction occurs, the pistol must be repaired by an armorer.

2.15.0 Stoppages

An unintentional interruption in the cycle of operation is referred to as a stoppage. Stoppages are normally discovered when the pistol will not fire. Many stoppages of the M9 pistol occur as a result of shooter error.

It is important to understand that there is no one set of procedures that can be performed to clear all—or even most—of the stoppages that can occur with the M9 service pistol. Therefore, personnel must be trained to quickly assess the cause of the stoppage and take appropriate remedial action to clear it.

2.15.1 Clearing Stoppages on the Range

Because of safety procedures in place on the firing range, stoppages are handled differently than when in a tactical environment. Learning how to clear stoppages should be accomplished through repetitious training in a sterile training environment where there is no live ammunition present. Trainers should set up drills that encourage personnel to repetitiously practice clearing different types of stoppages.

2.15.2 Clearing a Stoppage

When a shooter experiences a stoppage, the following steps shall be immediately followed:

1. Remove finger from the trigger and place it straight alongside the receiver.
2. Engage the decocking/safety lever.
3. Get behind cover.
4. Assess what caused the stoppage:
    a. Audible pop/reduced recoil – An audible pop occurs when only a portion of the propellant is ignited. It is normally identifiable by reduced recoil and a lower report. The pistol will not cycle, leaving the slide and hammer forward. This stoppage is sometimes accompanied by excessive smoke escaping from the chamber area. This can create a dangerous situation where the projectile becomes lodged in the bore. Before actions are initiated, wait a minimum of 10 seconds to ensure this is not a delay in the primer igniting the propellant (hangfire).

WARNING

When not sure why a stoppage has occurred, personnel should err on the side of safety; check for a bore obstruction only after waiting a minimum of 10 seconds to ensure a hangfire did not occur. In a hostile situation, however, there may not be enough time to permit the shooter to wait 10 seconds. This is a decision the shooter must make.

NOTE

When an obstructed bore is identified in a tactical situation (only), the shooter should use some type of field expedient (e.g., a cleaning rod) to attempt to clear the obstruction.

    b. Slide not forward in battery – Dirty ammunition or a dirty pistol can keep the slide from moving completely forward. When the slide is not forward in the battery, it can also be referred to as not fully seated.
    c. Stovepipe – A stovepipe occurs when the weapon fails to eject the casing, causing the brass to be caught between the chamber and the slide.
    d. Double feed – A double feed occurs when two rounds become lodged in the receiver.
5. Take appropriate action to reduce stoppage, based on cause.

2.16.0 Immediate Action

Immediate action is the prompt action taken by the user to correct a stoppage. The procedure for applying immediate action should become instinctive to the user, without the user attempting to discover the cause. It is important that the user apply immediate action instinctively to correct a stoppage.

WARNING

During the following procedures always keep the pistol pointed in a safe direction.

1. When the slide is fully forward and the pistol fails to fire, apply immediate action as follows:
    a. Ensure that decocking/safety lever is in the fire (up) position.
    b. If the pistol does not fire, ensure that the magazine is fully seated; retract the slide to the rear and release.
    c. Squeeze the trigger.
    d. If the pistol still does not fire, remove the magazine and retract the slide to eject the chambered cartridge. Insert a new magazine; retract the slide and release to chamber another cartridge.
    e. Squeeze the trigger.
    f. If the pistol still does not fire, replace the ammunition.
    g. If the pistol still does not fire after the application of immediate action, clear/unload the pistol and perform a detailed inspection to determine the cause of the stoppage. If the cause cannot be determined by the operator, carefully return the pistol to the Armory for inspection.

WARNING

During the following procedures, always keep the pistol pointed in a safe direction.

2. When the slide is not fully seated forward, remove finger from the trigger. With the other hand, attempt to push the slide fully forward. If the slide will not move forward, proceed as follows:
    a. Place decocking/safety lever in safe (down) position.
    b. Remove magazine.
    c. Grasp the slide and retract to the rear, locking it with the slide stop.
    d. Inspect the chamber and bore and remove any obstructions.
    e. Insert another loaded magazine into the pistol.
    f. Release slide.
    g. Place decocking/safety lever in fire (up) position, aim, and attempt to fire.

WARNING

If a round has been assembled without powder (a faulty manufacturing process), the primer alone has enough power to expel the bullet from the case to lodge in the bore. A bullet lodged in the bore will cause destruction of the pistol if another round is fired, and will also cause personal injury.

NOTE

If the pistol does not fire after the application of immediate actions (paragraphs 1 and 2 above), a detailed inspection should be made to determine the cause of the stoppage. If the cause cannot be determined by the operator, carefully return the pistol to the Armory for inspection.

2.17.0 Safe Weapon Handling Procedures for the M9 Service Pistol at the Clearing Barrel

The sole purpose of a clearing barrel is to provide a safe direction in which to point a weapon when performing any or all of the following functions:

1. Load and Make Ready
2. Unload

At every duty station, written clearing barrel procedures shall be posted near the clearing barrel. The clearing barrel supervisor shall read each command slowly and clearly, while closely monitoring the process.

The following procedures should always be followed prior to using a clearing barrel:

1. Inspect general condition of the clearing barrel.
2. Inspect behind/adjacent to the clearing barrel.
3. Clear unnecessary personnel away from the clearing barrel.

Personnel should line up at the clearing barrel and, one at a time, follow the directions described below.

2.17.1 LOAD AND MAKE READY Clearing Barrel Procedures for the M9 Service Pistol

On the supervisor's command LOAD AND MAKE READY, personnel will place their trigger finger straight along the receiver, keep the pistol pointed in the clearing barrel, and perform the following steps to take the pistol from Condition 4 to Condition 1:

1. Ensure the pistol is in Condition 4, with the slide locked to the rear.
2. Visually and physically verify that the firearm is clear and safe.
3. With the firing hand firmly gripping the pistol and the pistol pointed in the clearing barrel, rotate the pistol so the magazine well is inboard and clearly visible, while drawing the firing elbow in to facilitate control of the pistol.
4. With the nonfiring hand, remove a filled magazine from the ammunition pouch. Slide the index finger along the forward edge of the magazine until the finger is touching the tip of the round to ensure the magazine is filled.
5. Insert the filled magazine into the magazine well, verifying orientation of magazine with the index finger.With fingers extended; push the magazine with the heel of the hand until it is fully seated. Do not relinquish control of the magazine until it is fully seated.

⚠ CAUTION ⚠

Due to the weight of a fully filled magazine, releasing control of the magazine early can cause it to fall out of the magazine well.

Slapping the bottom of the magazine can dislodge rounds, which in turn, may cause a stoppage.

6. Visually and physically ensure that the firearm is on safe.
7. With the trigger finger extended straight along the receiver, release the slide to chamber a round. Visually and physically verify the slide is fully forward. Ensure a round is chambered by physically checking the loaded chamber indicator.

NOTE

When there is a round in the chamber, the upper surface of the extractor protrudes from the right side of the slide. The protrusion can be felt by sliding a finger or thumb of the nonfiring hand over the top of the slide and across the extractor. This check is effective during both daylight and darkness.

8. Ensure the safety is on and the hammer is forward.

2.17.2 UNLOAD Clearing Barrel Procedures for the M9 Service Pistol

On the supervisor's command UNLOAD, personnel will place their trigger finger straight along the receiver, keep the pistol pointed in the clearing barrel, and perform the following steps to take the pistol from Condition 1 or 3 to Condition 4:

1. Visually and physically ensure the pistol is on safe.
2. With the nonfiring thumb, depress the magazine catch, remove the magazine, and hand it to the clearing barrel supervisor.
3. With the muzzle pointed into the clearing barrel, hold the firearm at a 45-degree angle. With the nonfiring hand grabbing the slide and cupped over the ejection port, lock the slide to the rear, ejecting the chambered round into the cupped hand. Hand the round to the clearing barrel supervisor. (A safe-eject device may be used for this step, if present.)
4. Visually and physically check the firearm to ensure it is clear and safe, making sure the magazine well and chamber are empty.
5. Bring firearm to administrative transport position. Turn the firearm over to relief personnel or return it to the Armory.

NOTE

Whenever an M9 service pistol is transferred or returned to the Armory, it should be in Condition 4, with the slide locked to the rear.

2.18.0 Caring and Cleaning the Pistol

⚠ CAUTION ⚠

The bore brush is for cleaning the bore only. Use of the bore brush on any other part of the pistol will cause damage.

NOTE

When cleaning, be careful not to lose component parts.

2.18.1 Slide Assembly

Clean slide assembly (*Figure 11-23*) with cloth. A soft brush and Cleaner Lubricant Preservative (CLP) can assist in removal of excess dirt and carbon buildup. Ensure the decocking/safety lever, breech face, slide guides, and extractor are free of excess dirt and residue.

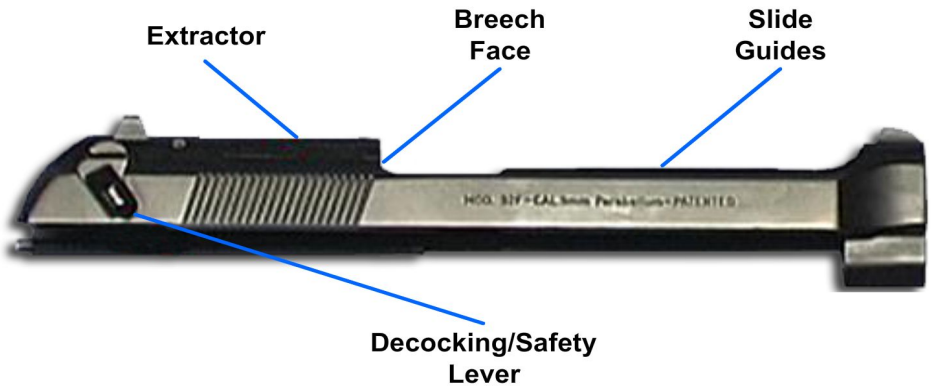


Figure 11-23 — Slide assembly.

Wipe dry with a cloth and apply a light coat of CLP/Lubricating, Semi-fluid Automatic Weapons (LSA).

2.18.2 Barrel Assembly

To clean the barrel assembly, (*Figure 11-24*) use a cleaning rod and insert a cleaning patch soaked with CLP in the chamber end of barrel and push out the muzzle to remove



Figure 11-24 — Barrel assembly.

loose firing residues and soften carbon deposits.

Insert the bore brush into the chamber end of barrel, making sure it completely clears the muzzle before it is pulled back through the bore. Repeat several times to loosen carbon deposits.

Wipe loose carbon deposits from the bore with another clean patch soaked with CLP.

Dry the barrel by pushing a swab through the bore. Repeat until a clean swab can be observed.

Clean the locking block with a soft brush, such as a toothbrush, if necessary.

Apply a light coat of CLP/LSA to the barrel bore and chamber area. Also, lubricate the exterior surfaces of the barrel and locking block.

2.18.3 Recoil Spring and Recoil Spring Guide

Clean recoil spring and recoil spring guide (*Figure 11-25*) using CLP and a soft brush or cloth.

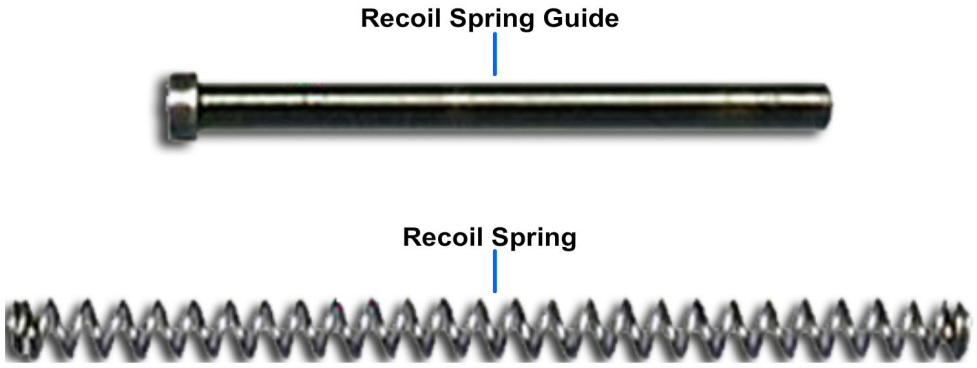


Figure 11-25 — Recoil spring and guide.

After wiping the recoil spring and guide clean, apply a light coat of CLP/LSA.

2.18.4 Receiver Assembly

⚠ CAUTION ⚠

Do not allow the hammer to fall with full force by pulling the trigger when the slide is removed as damage to the receiver will occur. If necessary, the hammer should be manually lowered. When cleaning the magazine well area, take care not to dislodge the trigger bar spring from the hole provided in the trigger bar and receiver.

Wipe the receiver assembly (*Figure 11-26*) clean with a cloth. Use a soft brush for hard to clean areas. Pay special attention to the disassembly lever, trigger, slide stop, hammer, and magazine release button.

Apply a light coat of CLP/LSA.

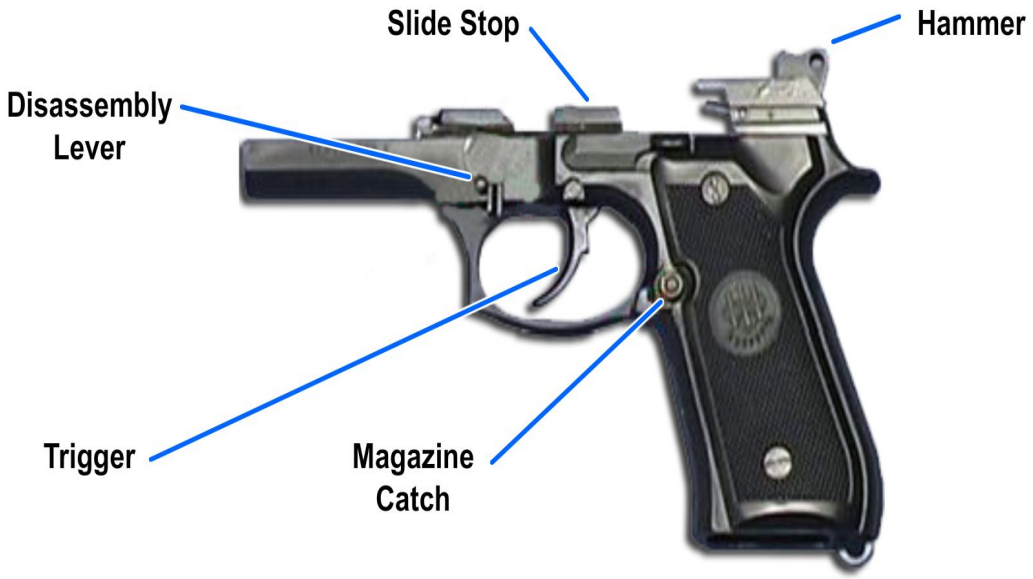


Figure 11-26 — Receiver assembly.

2.18.5 Magazine

Wipe the magazine tube and follower with a cloth. Clean the magazine tube and follower with CLP and a soft brush.

With a cloth, wipe the magazine spring, floorplate retainer, and floorplate clean. Apply a light coat of CLP/LSA.

2.19.0 Ammunition

Use any NATO-qualified 9mm ammunition (*Figure 11-27*), any U.S.-produced M882 ball, or any issued ammunition authorized by your service. The correct caliber of the weapon is 9x19mm (9mm NATO).

Do not fire heavily corroded or dented cartridges, cartridges with loose bullets, or any other defective rounds detected by visual inspection.



Figure 11-27 — 9mm ammunition.

Dispose of any ammunition, which fails to fire according to authorized procedures.

Protect ammunition from mud, sand, and water. If the ammunition gets wet or dirty, wipe it off at once with a clean dry cloth. Wipe off light corrosion as soon as it is discovered. Turn in heavily corroded cartridges.

Do not expose ammunition to the direct rays of the sun. If the powder is hot, excessive pressure may develop when the pistol is fired.

Do not oil or grease ammunition. Dust and other abrasives that collect on greasy ammunition may cause damage to the operating parts of the pistol. Oiled cartridges produce excessive chamber pressure.

3.0.0 THE MOSSBERG 500 SHOTGUN

The Mossberg 500 shotgun (*Figure 11-28*) is a shoulder-fired weapon and is the basic shotgun used by U.S. naval forces. It is a 12-gauge, manually operated, pump-action, repeating shotgun with a 5-round tubular-magazine. The Mossberg 500 is both an offensive and defensive weapon. It has a thumb slide safety mounted on the top rear of the receiver. It is typically used at ranges of up to 50 yards (46 m) with a shot load, and up to 100 yards (91 m) with a slug load.

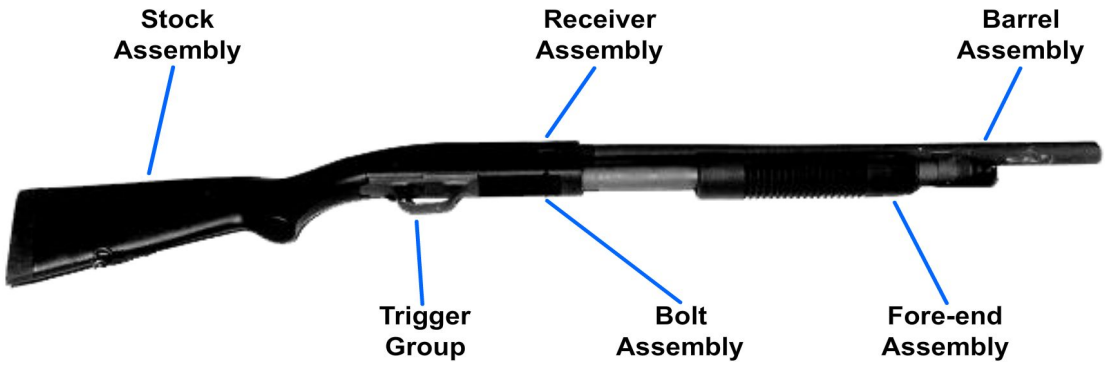


Figure 11-28 — Mossberg 500 shotgun.

The Mossberg 500 shotgun has the following major components:

- Stock assembly – an extension of the receiver group, it provides the support to shoulder-fire the shotgun.
- Receiver assembly – houses the cartridge ejector and serves as support for all major groups and assemblies of the weapon.
- Barrel assembly – houses cartridges for firing. The front sight serves as an aiming device.
- Trigger group – houses the components required to provide locking, initial feeding, loading, firing, and safety functions.
- Fore-end assembly – used to open and close the bolt assembly; permits loading and firing of weapon and ejection of spent cartridge.
- Bolt assembly – feeds and locks the round in the chamber. The firing pin detonates the primer to fire the weapon. The fired round is removed from the chamber by the extractors.

3.1.0 Characteristics of the M500

Technical characteristics specific to the M500 are listed in *Table 11-10*.

WARNING

Never mix live ammunition and dummy ammunition.

Table 11-10 — Technical Characteristics of the M500

WEAPON SPECIFICATIONS	
MODEL	**MIL-S 500**
NSN	1005-01-371-4462
Manufacturer	Mossberg
Caliber	12 gauge (18.52mm)
Mechanism Type	Pump slide action
Magazine Type	Tube
Ammo Capacity	5 + 1 rounds
Weight (empty)	6.9 lb (3.13 kg)
Overall Length	37.5 in (953 mm)
Barrel Length	17 or 20 in (432 or 508mm)
Muzzle Velocity	#00 Buck — 1,375 fps (419 mps) Slug — 1,590 fps (485 mps)
Maximum Effective Range	#00 Buck — 50 yards (46 m) Slug — 100 yards (91 m)
Maximum Range	#00 Buck — 660 yards (604 m) Slug — 1,180 yards (1,079 m)

3.2.0 Components

The Mossberg 500 has four major component groups; the stock, receiver, barrel, and trigger group assembly. These major components are broken down into sub-components and described in *Table 11-11*.

Table 11-11 — Common Major Components of the M500

Stock Assembly	
Part	**Characteristics**
Buttplate	May be recoil pad or hard plastic
Stock	Wood or synthetic
Receiver Assembly	
Part	**Characteristics**
Safety	Locks weapon
Trigger	Initiates firing sequence
Bolt	Contains firing pin and extractor
Loading Port	Area in which shells are inserted
Ejection Port	Area from which spent casings are ejected
Trigger Guard	Protects trigger
Bolt Lock	When the bolt is moved forward, the top front end of the bolt lock is cammed up, locking into the barrel extension
Action Lock Lever	Allows action to be moved to the rear Located rear of the trigger guard on right side
Alignment Grooves	On top rear of receiver, used in conjunction with front sight bead when aiming
Fore-end	Used to open and close bolt assembly, permitting loading and firing of weapon and ejection of spent cartridge
Magazine Tube	Below the barrel
Barrel Assembly	
Part	**Characteristics**
Barrel Type	Smoothbore
Length	17 or 20 in
Front Sight	Fixed bead
Muzzle	Cylinder bore or “open choke”
Magazine Cap	Holds barrel in receiver
Trigger Group	
Part	**Characteristics**
Trigger	Moves disconnector forward
Disconnector	Disengages sear from hammer
Sear	Releases the hammer
Hammer	Rotates and strikes firing pin
Mainspring	Drives hammer

3.3.0 Cycle of Operation

It is important to understand the routine cycle of operation to ensure the M500 is readily available for action. There are eight steps in the cycle of operation of the M500 as shown in *Table 11-12*.

Table 11-12 — Routine Cycle of Operation for the M500

STEP	ACTION
Feeding	A round is pushed onto the elevator by the magazine follower.
Chambering	When the fore-end is pushed forward, the round is stripped from the elevator and chambered.
Locking	When the bolt is moved forward, the top front end of bolt lock is cammed up, locking into barrel extension.
Firing	The cycle begins by pulling the trigger.
Unlocking	As the fore-end is pulled back, the bolt moves rearward until the bolt slide stops at the back of receiver.
Extracting	The fired casing is extracted from the chamber by pulling the fore-end rearward.
Ejecting	Near the end of the rearward stroke, the casing is pivoted out through the ejection port.
Cocking	As the bolt moves to the rear, it resets the hammer assembly.

3.4.0 Weapon Condition Codes for the Mossberg 500 Shotgun

The Mossberg 500 safety status is defined by four weapon condition codes. Weapon condition codes specific to the Mossberg 500 are defined in *Table 11-13*.

Table 11-13 — Weapon Condition Codes for the Mossberg 500 Shotgun

Condition	Action
1	Magazine tube filled, round in chamber, action closed, weapon on safe
2	Not applicable for the service shotgun; Condition 2 pertains to weapons with external hammers only
3	Magazine tube filled, chamber empty, action closed, weapon on safe
4	Magazine tube empty, chamber empty, action closed, weapon on safe

3.5.0 General Disassembly (Field Stripping)

Field stripping (*Figure 11-29*) instructions are broken down as different assemblies and are as follows:

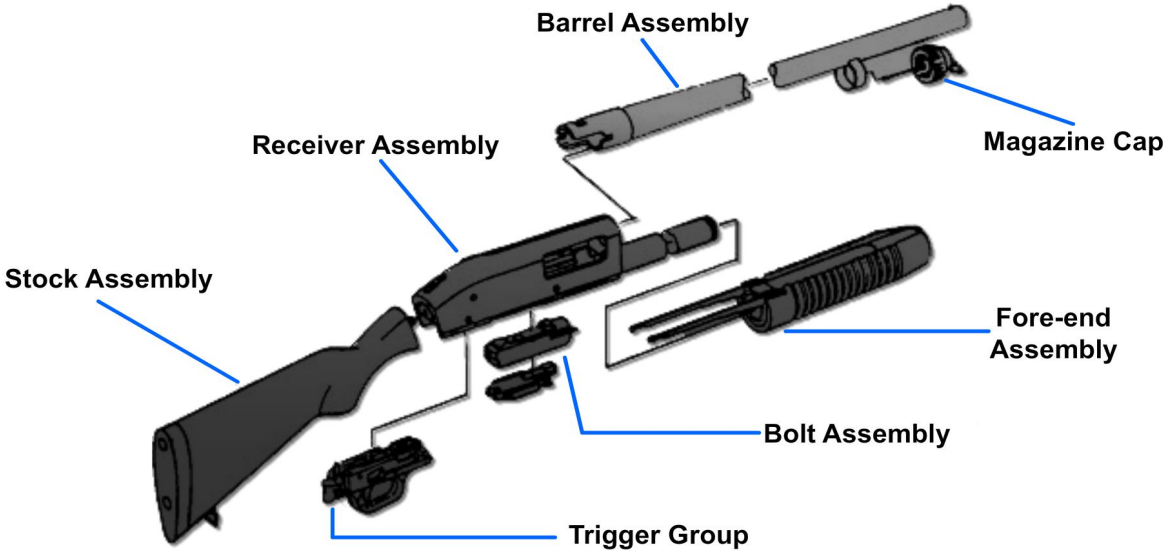


Figure 11-29 — Mossberg 500 disassembed.

To remove the barrel the following procedures should be used:

1. Move the safety button located at the top rear of the receiver (*Figure 11-30, frame 1*), to the "on" (fully rearward) position.
2. Depress the action lock lever and open the action by sliding the forearm fully rearward (*Figure 11-30, frame 2*).
3. Inspect the chamber (*Figure 11-30, frame 3*), elevator, and magazine tube to ensure that the shotgun is unloaded.
4. Move the forearm slowly forward from the fully rearward position until the front of the bolt is in the middle of the ejection port.
5. Remove the magazine cap by turning counterclockwise (*Figure 11-30, frame 4*), until the screw threads are completely disengaged from the end of the magazine tube.
6. Remove the barrel (*Figure 11-30, frame 5*), from the receiver with a gentle back and forth rotational movement while pulling the barrel out of the receiver assembly.

Interaction Available



Figure 11-30 — Barrel assembly removal.

To remove the trigger group, the following steps should be used:

1. Position the shotgun on a clean surface with the trigger guard upward (*Figure 11-31, frame 1*).
2. Using a 1/8" pin punch push out the trigger housing retainer pin located on the side of the receiver (*Figure 11-31, frame 2, frame 3, frame 4, and frame 5*).
3. Remove the trigger group (*Figure 11-31, frame 6*), by rotating the rear portion upward first.

⚠ CAUTION ⚠

Do not pull the trigger and allow the hammer to fall when the trigger group is removed from the receiver. To do so may result in personal injury or damage to the assembly.

To disassemble the internal receiver components, follow the steps below:

Interaction Available



Figure 11-31 — Removing the trigger group.

1. Remove the cartridge interrupter from the ejection port side of the receiver.
2. Remove the cartridge stop from the opposite side of the receiver. (It may be necessary to tap the sides of the receiver lightly to release these parts.)

NOTE

Study the position of the bolt, bolt slide, and action bar assembly as these parts must be in the same relationship during reassembly.

3. Move the forearm/action slide assembly rearward so that the bolt assembly and bolt slide are three quarters of the way rearward.
4. When the bottom of the bolt slide is aligned with the clearance cuts in the side of the receiver, lift the bolt slide upward and out of the receiver.
5. Remove the fore-end assembly from the magazine tube.
6. Push the bolt out of the front of the receiver assembly.
7. Compress and remove the elevator from the receiver.

3.6.0 Assembly

To assemble the internal receiver components, follow the steps below:

1. Ensure the safety button is in the "on" (fully rearward) position.
2. Insert the compressed elevator into the receiver.
3. Depress the ejector and insert the bolt.
4. Push the sides of the elevator down beside the bolt and slide the bolt back.
5. Install the fore-end assembly over the magazine tube. Insert the action bars into the slots in the front of the receiver on either side of the magazine tube.
6. Insert the bolt slide, lower the front end, and insert the rear end first so lug fits in the slot in the bolt lock and is retained by the action bars.
7. Push down the bolt slide and move action slide to the rear until it is engaged.
8. Move the bolt, bolt slide, and action forward.
9. Insert the interrupter and cartridge stop.

NOTE

The hammer must be in the fully cocked position to allow the trigger housing to be inserted in the receiver.

Install the trigger housing using the following steps:

1. Hold the cartridge stop and cartridge interrupter in place firmly against the receiver walls with one hand and grasp the trigger housing assembly with the other.
2. Insert the lugs on each side of the front corner of the trigger housing into the slots on each side of the receiver (*Figure 11-32, frame 1*).

3. Ease the rear of the housing assembly down and into position. **DO NOT FORCE!**
4. Align the trigger housing pinhole in the trigger housing assembly (*Figure 11-32, frame 2*) with those in the receiver.
5. Insert the trigger housing pin and push the pin in fully until it is flush with the side of the receiver (*Figure 11-32, frame 3*).



Figure 11-32 — Installing the trigger group.

NOTE

If the trigger housing does not fit into place easily, check that all internal pins in the trigger housing are flush with the side of the housing and that the cartridge interrupter and cartridge stop are positioned properly.

Install barrel assembly (*Figure 11-33*) using the following steps:

WARNING

Visually inspect the inside of the barrel to ensure it is free from obstructions, excessive oil, or grease. Failure to do so may result in gun damage and/or personal injury when the shotgun is fired



Figure 11-33 — Installing the barrel assembly.

1. Depress the action lock lever and move the forearm rearward until the front of the bolt is in the middle of the ejection port.
2. Slide the barrel into the receiver and tighten the magazine cap finger tight only. **DO NOT** use pliers or a wrench to tighten.

⚠ CAUTION ⚠

Ensure the barrel is fully seated into the receiver by looking through the ejection port. The barrel extension must rest firmly against the corresponding cut in the top of the receiver.

3.7.0 Functioning

The operation of the shotgun is completed by pulling the trigger, sliding the fore-end to the rear to open the action, and sliding the fore-end forward again to close the action. The fore-end is mounted on double action bars and fully controlled by the operation. With the magazine fully loaded and one shell in the barrel chamber locked up, the shotgun is ready to fire.

3.8.0 Safe Operation Procedures

This section provides the information necessary to understand the safety features, operation, and conditions of readiness specific to the Mossberg 500. The standardized procedures included in this chapter, when consistently applied, will maximize safety during weapons handling and promote the effective employment of this shotgun.

A manual safety device has been provided which prevents firing the shotgun when placed in the "on" safe (fully rearward) position as shown in *Figure 11-34*.

The safety button is manually movable between the safety detent position and the fire position. It will remain in either position until reset manually. A red dot (located at the top rear portion of the receiver in the safety button slot) has been provided as a visual aid. The user must ensure the safety button is manually set fully rearward to be in the "on" or "safe" position. When the red dot is visible the safety is off and the weapon is ready to fire.



Figure 11-34 — Safety button.

NOTE

Before loading the Mossberg 500, check the weapon for dirt, excess oil, and grease. Check the bore to ensure it is free of foreign matter and obstructions.

3.9.0 Loading

Conduct the following steps to properly load the Mossberg 500 shotgun:

1. With the muzzle pointed in a safe direction, ensure the weapon is in Condition 4.
2. Rotate the weapon inward until the magazine tube is visible.
3. Tuck the stock of the shotgun under the firing arm against the rib cage. Cradle the weapon with the firing hand forward of the receiver.

NOTE

Maintain muzzle awareness and control of the weapon at all times.

4. Remove a round from the ammunition pouch with the nonfiring hand.
5. Press the round down into the receiver through the loading port with the thumb of the nonfiring hand until the crimped end of the round rests against the magazine tube follower.
6. With the thumb of the nonfiring hand, push the round into the magazine tube until the brass rim of the round base snaps into place past the cartridge stop. This prevents the round from sliding back out of the magazine tube. An audible click should be heard when the round is fully inserted.
7. After the first round has been loaded, repeat steps 4 through 6 until the desired number of rounds has been loaded into the magazine tube.

3.10.0 Firing

When ready to fire, personnel shall perform the following steps:

1. Aim the shotgun. Take the shotgun off safe and squeeze the trigger.
2. Pull the fore-end quickly to the rear to eject the empty round case. Push the fore-end fully forward to chamber a new round. The process of pulling the fore-end to the rear and pushing the fore-end forward is referred to as cycling the action.

3.11.0 Unloading

Conduct the following steps to properly unload the Mossberg 500 shotgun:

1. With the muzzle pointed in a safe direction, ensure the shotgun is on safe.
2. Rotate the shotgun until the magazine tube is facing upward and the shotgun stock is under the firing arm.
3. With the forefinger of the nonfiring hand or the thumb of the firing hand, depress the cartridge stop and release a round from the magazine tube with either hand. Remove the round from the magazine tube and place it in an ammunition pouch.
4. Repeat step 3 until the magazine tube is empty.
5. Rotate the shotgun to the upright position. Place the stock of the shotgun on the firing-side hip or under the firing-side arm. Depress the action lock lever with the trigger finger of the firing hand and slowly pull the fore-end to the rear with the nonfiring hand. As soon as the fore-end moves slightly rearward, release the action lock lever and cover the ejection port with the palm of the firing hand.
6. Remove the round from the ejection port with the firing hand.
7. Visually inspect the magazine and chamber to ensure no ammunition is present.
8. Push the fore-end fully forward and observe the bolt going forward on an empty chamber.

3.12.0 Stoppages

Remedial action requires investigating the cause of the stoppage, clearing the stoppage, and returning the shotgun to operation. Personnel shall perform the following steps to identify a stoppage:

1. Remove the shotgun from the shoulder.
2. Pull the fore-end to the rear.
3. Observe the ejection port and chamber.

The steps to clear the shotgun and return the weapon to action are selected based on the indicators described in the following section.

NOTE

Seek cover before performing remedial action procedures in a tactical environment (if the situation permits).

3.13.0 Immediate Action

Immediate action is the action performed immediately by the shooter any time there is an unscheduled or unanticipated interruption of the shotgun operation. Immediate action should be practiced to the point that it occurs as a reflex action.



During immediate action, make certain the shotgun is pointed in a safe direction at all times!

1. Pull the fore-end to the rear.
2. Check the ejection port.
3. If a cartridge case is ejected, push the fore-end forward and attempt to fire again.
4. If the weapon still fails to fire, perform remedial action.

3.14.0 Remedial Action

Remedial action is the action performed to remedy a problem and place the shotgun back into operation after immediate action has been performed and proves ineffective.

WARNING

During remedial action, make certain the shotgun is pointed in a safe direction at all times!

To perform remedial action:

1. Clear the shotgun.
2. Check the chamber for and remove any type of obstruction caused by an empty or ruptured case, live rounds, or foreign matter.
3. Reload the magazine tube.
4. Chamber a new cartridge.
5. Attempt to fire the weapon.
6. Notify the armorer if remedial action fails to correct the problem.

3.15.0 Caring and Cleaning the Shotgun

Normal cleaning is performed after each firing, or monthly, or after any exposure to extreme environmental conditions such as salt, fog, sand, mud, water, etc.

To clean the barrel bore:

1. Dip the bore cleaning brush in bore cleaning solution and brush the chamber and bore from the chamber end of the barrel.
2. Pull the brush through the chamber and bore.
3. Continue brushing until the chamber and bore are well covered with solution.

To clean the Barrel Assembly and Bolt Assembly:

1. Use the bore cleaning brush with bore cleaning solution and clean all carbon and powder residue from the extractor and bolt face.
2. Carefully clean under the hooks of the extractors.

To clean other metal surfaces:

1. Using a fiber or nylon brush and solvent cleaning solution, clean the remaining surfaces on all metal parts.
2. Wipe all metal parts of the shotgun with clean, dry, cotton wiping rags, pipe cleaners, or cleaning patches.

3. When wiping out the barrel chamber and bore, use a new dry patch inserted on the cleaning rod for each pass through the barrel.
4. Continue this process until a patch comes out of the barrel clean and dry.

3.15.1 Safety/Function Check

A safety/function check should be performed any time the shotgun is reassembled. This quick check indicates whether or not the weapon was properly assembled and with all the components. A properly executed safety/function check can also reveal many of the more obvious malfunctions that could occur between the interactive components of the weapon. Always assume every weapon is loaded until proven otherwise.

The following steps should be taken to conduct this safety/function check:

1. Clear the shotgun!
2. Move the safety button to the "on" (fully rearward) position.
3. Close the action fully. The action lock lever should be fully down.
4. Pull the trigger. The hammer should not fall.
5. Put safety in the "off" (fire) position by pushing the safety fully forward.
6. Pull the trigger. The hammer should fall and the action lock lever should be fully up.
7. Hold the trigger to the rear and recock the hammer by opening and then closing the action fully. The hammer should not fall.
8. Release the trigger. The hammer should not fall and the trigger should return to its forward position.
9. Pull the trigger. The hammer should fall and the action lock lever should be fully up.
10. Release and recock the hammer by opening and closing the action fully. The hammer should not fall.
11. Move the safety button to the "on" (fully rearward) position.
12. Load two dummy shotshells into the magazine tube.
13. Depress the action lock lever and open the action fully. Dummy shotshell should feed onto the elevator.
14. Release the action lock lever and close the action fully. Dummy shotshell should feed into the chamber.
15. Depress the action lock lever and open the action fully. The first dummy shotshell should be extracted and ejected and the second dummy shotshell should feed onto the elevator.
16. Release the action lock lever and close the action fully. The second dummy shotshell should feed into the chamber.
17. Depress the action lock lever and open the action fully. The second dummy shotshell should be extracted and ejected.

3.15.2 Lubricate After Firing

Immediately after firing the shotgun, clean the receiver, chamber, firing pin well on bolt assembly and any other powder-fouled surfaces with Rifle Bore Cleaner (RBC).

1. Field-strip the shotgun.
2. Clean components with CLP.
3. Wipe parts dry and lubricate with CLP.
4. Reassemble the shotgun.
5. Wipe the shotgun with a light coat of CLP to prevent rust.
6. Thereafter, clean and lubricate the shotgun every 90 days, unless inspection reveals more frequent servicing is required.

3.16.0 Ammunition

The ammunition for the Mossberg 12-gauge Shotgun Model 500 (*Figure 11-35*) is classified as small arms ammunition and is issued in the form of a complete round. The cartridge consists of lead projectiles (dependent on ammunition used), cartridge case, wading, propellant powder, and primer necessary to fire the weapon.

Non-military specification ammunition is not authorized for use in military weapons.

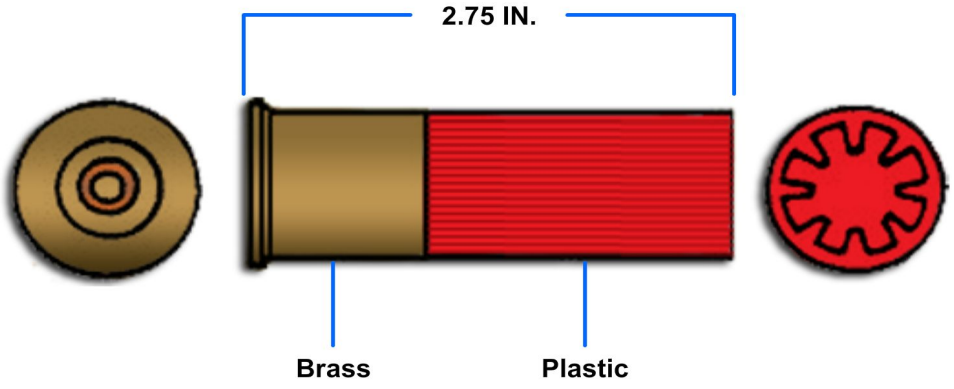


Figure 11-35 — Mossberg 500 ammunition.

WARNING

Use only 12-gauge 2.75-inch ammunition in the Mossberg 12-Gauge shotgun, model 500 that is authorized for use by your command.

4.0.0 THE M203 GRENADE LAUNCHER

When equipped with a grenade launcher, the M16A3 rifle becomes the M203 grenade launcher (*Figure 11-36*), and loses its identity as the M16A3 rifle. It is a lightweight, compact, breech-loading, pump-action (sliding-barrel), single-shot, manually operated weapon.



Figure 11-36 — The M203 grenade launcher.

The launcher attachment is assembled by a qualified armorer only. Members of a rifle platoon have the responsibility for the employment, trajectory, method of firing, firing effects, malfunctions, care, and cleaning of the launcher attachment.

The launcher (*Figure 11-37*) is approximately 16 inches in overall length; it weighs approximately 3.6 pounds loaded and 3 pounds unloaded. Its maximum range is 437 yards (400 m); its area target range is 383 yards (350 m); and its point target range is 164 yards (150 m).

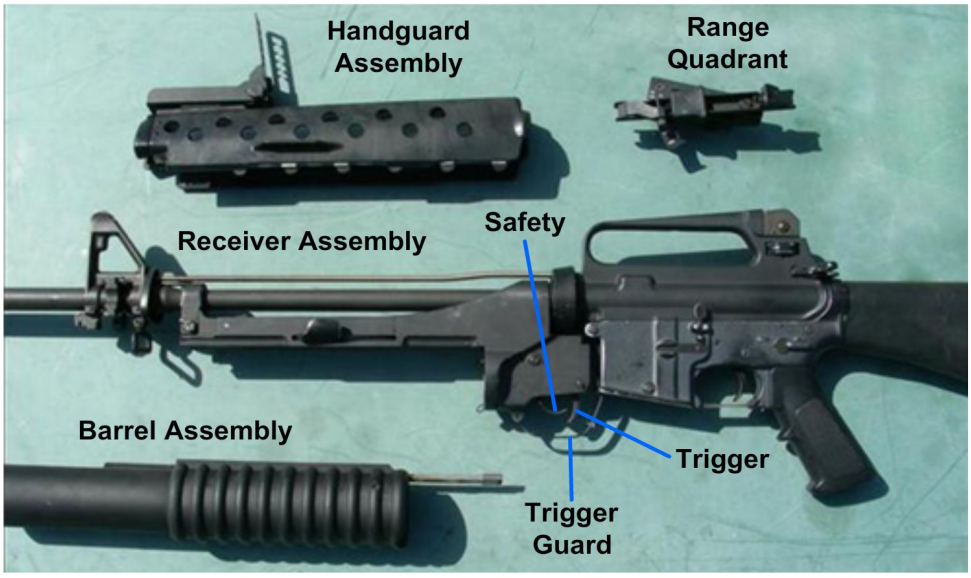


Figure 11-37 — Launcher.

4.1.0 Characteristics of the M203

Technical characteristics specific to the M203 are listed in *Table 11-14*.

Table 11-14 — Technical Characteristics of the M203

WEAPON SPECIFICATIONS	
Model	**M203**
NSN	1010-00-179-6447
Manufacturer	Colt Manufacturing Company
Mechanism Type	Single Shot
Magazine Type	N/A
Ammo Capacity	1 round
Weight (empty)	3 lb (1.4 kg)
Overall Length	16 in (406mm)
Barrel Length	12 in (305mm)
Muzzle Velocity	246 fps (75 mps)
Maximum Effective Range	Area target: 382 yards (350 m) Point target: 164 yards (150 m)
Maximum Range	437 yards (400 m)
Minimum Safe Range	Combat situation: 34 yards (31 m) Training situation: 142 yards (130 m)
Caliber	40mm, low velocity

4.2.0 Components

The M203 grenade launcher consists of a handguard and sight assembly with an adjustable metallic folding blade sight assembly; a plastic handguard; and a receiver assembly housing the barrel latch, barrel stop, and firing mechanism. These major components are broken down into subcomponents and described in *Table 11-15*.

Table 11-15 — Common Major Components of the M203

COMPONENT	FUNCTION
Handguard Assembly	Fits over the barrel of the M16A3 rifle. Made of molded plastic
Quadrant Sight Assembly	Provides range selection from 55 to 437 yards (50 to 400 m) in 27-yard (25 m) increments; attached to the carrying handle of the M16A3 rifle
Receiver Assembly	Houses the firing mechanism and ejection system and supports the barrel assembly; mounts to the underside of the M16A3 rifle
Barrel Assembly	Chambered for special 40mm grenade launcher ammunition; assembly slides forward and backward under the receiver assembly in the sliding tracks; consists of a specially treated aluminum barrel and plastic handgrip assembly
Leaf Sight Assembly	Located on top of the handguardassembly; provides range selection from 55 to 273 yards (50 to 250 m) in 55 yard (50 m) increments

4.3.0 Cycle of Operation

It is important to understand the routine cycle of operation to ensure the M203 is readily available for action. There are eight steps in the cycle of operation of the M203 as shown in *Table 11-16*.

Table 11-16 — Routine Cycle of Operation for the M203

STEP	ACTION
Firing	Ignition of the propellant within the cartridge case, which forces the projectile out of the barrel
Unlocking	Depressing the barrel latch and sliding the barrel assembly forward
Extracting	Extraction and cocking take place at the same time; as barrel assembly is opened, spring-loaded extractor keeps the spent cartridge seated against the receiver until the barrel is clear of the cartridge case
Ejecting	Spring-loaded ejector pushes the expended cartridge case or live round from the barrel assembly
Cocking	Weapon is cocked when the barrel assembly is opened; barrel latch, when depressed, unlocks the barrel assembly so that it can be moved forward along the receiver assembly
Feeding	When barrel assembly is in open position, cartridge is inserted into the breech end of the barrel
Chambering	Chambering takes place during closing of the barrel assembly; as breech end of barrel assembly closes, extractor contacts the rim of the cartridge and the round is firmly seated in chamber
Locking	As barrel assembly closes, barrel latch becomes engaged to the barrel assembly and cocking lever engages barrel extension so that it cannot be moved forward along the receiver assembly

4.4.0 Weapon Condition Codes for the M203

The safety status of the M203 is defined by one of four weapon condition codes. Weapon condition codes applicable to the M203 are listed in *Table 11-17*.

Table 11-17 — Weapon Condition Codes for the M203

CONDITION	ACTION
1	Round inserted, barrel latched down, safety is on
2	Not Applicable. There is no Condition 2 for the M203
3	Not Applicable. There is no Condition 2 for the M203
4	Weapon is free of ammunition, barrel latched down, safety is on

4.5.0 Handguard Assembly

The handguard portion of the assembly group is a molded plastic protective cover that fits over the barrel of the Ml6 rifle. The cover prevents the operator from coming into contact with the barrel when it becomes heated from rapid firing. The heat produced by the rifle barrel dissipates through the cooling holes and slots in the cover. The protruding plastic tab on the left side of the cover prevents the barrel latch of the grenade launcher from being accidentally pressed when the weapon is laid on its side.

4.6.0 Quadrant Sight Assembly

The M203 also has a quadrant sight assembly (*Figure 11-38*) that connects to the carrying handle of the M16 rifle. It consists of a rear sight aperture, front sight post arm, front sight post, sight latch, mounting screw, and a retainer. The range selection quadrant has embossed range graduations from 54 to 437 yards in 27-yard increments (50 to 400 in 25-m increments). The 27-yard (25-m) increments also allow for better accuracy at a greater number of range variations than the quadrant sight. For elevation adjustment, turn the front sight post to the right to decrease elevation and to the left to increase elevation.



Figure 11-38 — Quadrant sight assembly.

NOTE

On elevation, one notch equals 5 yards (5 m) at 219 yards (200 m). For windage adjustment, press the rear sight retainer and move the aperture away from the barrel to move the trajectory of the projectile to the left. Move the aperture toward the barrel to move the trajectory to the right.

NOTE

On windage adjustment, one notch equals 2 yards (1.5 m) at 219 yards (200 m).

4.7.0 Receiver Assembly

The receiver assembly (*Figure 11-39*) consists of an aluminum receiver that houses the barrel latch, the barrel stop, and the firing mechanism. The receiver assembly attaches to the barrel of the rifle, thereby mounting the grenade launcher to the rifle. The receiver assembly also contains the follower assembly, the trigger, and the safety components that serve to fire or prevent accidental firing of the grenade launcher.



Figure 11-39 — Receiver assembly.

4.8.0 Barrel Assembly

The barrel of the barrel assembly (*Figure 11-40*) is constructed of specially treated and machined aluminum. The barrel extension is a rectangular, chrome-plated steel bar. It attaches to the barrel and provides a means of attaching the barrel to the receiver assembly. The handgrip is a molded plastic corrugated sleeve. When the grenade launcher is being fired, the plastic handgrip allows the operator to hold the launcher without discomfort from the heat.



Figure 11-40 — Barrel assembly.

4.8.1 Barrel and Barrel Latch

The barrel latch (*Figure 11-41*)—when depressed—unlocks the barrel so it can be moved forward along the receiver assembly. As the barrel and barrel extension (which is interlocked with the cocking lever) move forward, the cocking lever is forced downward. The cocking lever, in turn, forces the spring-loaded firing pin rearward. At the same time, the spring-loaded follower follows the barrel extension forward. As the barrel continues its forward movement, the barrel extension disengages from the cocking lever; the movement of the follower is restricted by the receiver and the follower holds the cocking lever in the down position. When the barrel is moved rearward, the follower is driven rearward; the cocking lever again engages the barrel extension, and the firing pin moves slightly forward and engages the sear.



Figure 11-41 — Barrel latch.

4.8.2 Barrel Stop

The barrel stop limits the forward motion of the barrel assembly. This prevents the barrel assembly from sliding off the receiver-assembly barrel track during loading and cocking operations. When depressed, the barrel stop allows the barrel assembly to be removed from the receiver assembly for maintenance purposes.

4.9.0 Leaf Sight Assembly

The leaf sight portion of the assembly is a metallic folding blade sight. It provides range selection from 55 to 273 yards in 55-yard increments (50 to 250 m in 50-m increments). The windage adjustment screw moves the blade element horizontally to provide windage adjustment capabilities. The elevation adjustment machine screw, when loosened, allows the blade element to be moved vertically, providing elevation adjustment capabilities.

4.9.1 Leaf Sight Zeroing Procedures

To zero in the grenade launcher leaf sight (*Figure 11-42*), you should set up a target at 219 yards (200 m). Remember not to perform these procedures at ranges less than 109 yards (100 m). The 55-yard (50-m) mark on the leaf sight blade is marked in red to emphasize that this range is not to be used in the zeroing-in procedures.

Be sure to perform the before-firing preventive maintenance services and the loading procedures as specified. Place the leaf sight blade of the weapon in the upright position. Choose the firing position, preferably a supported prone position. Align the target with the appropriate range increment of the leaf sight blade and the front post sight of the rifle. Fire the weapon, using the firing procedures given. Make any applicable windage or elevation adjustments.



Figure 11-42 — Leaf sight assembly.

NOTE

Turning the sight windage screw clockwise moves the leaf sight to the left. Raising the leaf sight increases the range, and lowering the leaf sight decreases the range.

Adjust for wind, each increment turn of the windage screw equals a 2-yard (1.5-m) adjustment when you are firing on the 219-yard (200-m) range.

Adjust for elevation; each increment turn of the elevation adjustment machine screw equals an 11-yard (10-m) adjustment when you are firing on the 219-yard (200-m) range.

Fire three rounds and make the necessary adjustments after each round. When three consecutive rounds land within 5 to 11 yards (5 to 10 m) of the target, the zeroing-in procedures are complete.

4.10.0 Loading Procedures

Ensure the M203 and the M16A3 is on SAFE. Press the barrel latch and slide the barrel forward. With the barrel assembly open, place a round into the breech, taking care to ensure it is snug in place and will not fall out. Slide the barrel down until it locks in place. Physically inspect the weapon to be sure the round is seated correctly by pushing forward on the barrel.

4.11.0 Firing Procedures

The grenade launcher may be fired from any of the following positions: prone, sitting, kneeling, or standing. For all positions, the firing procedures are as follows:

1. With the grenade launcher loaded, position the weapon and sight.
2. Move the safety to the fire position.
3. Place the butt of the stock firmly against your shoulder. In firing long range from the prone position, place the butt of the stock firmly on the ground. Take aim and squeeze the trigger to fire the weapon.

WARNING

When firing high-explosive (HE) rounds at targets within leaf sight ranges of 55 to 87 yards (50 to 80 m), you should be in a protected position. Also, targets within an 87-yard (80-m) radius of unprotected friendly troops should not be engaged. The danger radius of practice rounds is 22 yards (20 m). In addition, observe precautions and warnings pertaining to the type of ammunition being used.

4.12.0 Unloading Procedures

Before unloading the launcher, be sure to point the muzzle clear of all other personnel within the area. Place the M203 and the M16A3 on SAFE. Depress the barrel latch and slide the barrel forward. Place the hand under the breech to catch the round as it is ejected. Elevate the weapon and visually and physically ensure that the chamber is clear. Clear the M16A3. Close the breech, place the M203 on SAFE (if not already on SAFE), recover, inspect, and retain any ejected live rounds.

4.13.0 Misfire, Hangfire, and Stoppage

- Misfire – a complete failure to fire because of a mechanical failure, not a delay in firing like a hangfire. It is not dangerous, but it must be treated as a hangfire (which is dangerous) until such possibility has been eliminated.
- Hangfire – a delay in the functioning of the propelling charge. Wait 30 seconds from the time the charge fails to fire before opening the breech for unloading procedures. Caution is required, as this can be very dangerous. Clear the area of all personnel not needed to correct the hangfire.
- Stoppage – any interruption in the cycle of operation caused by faulty action of the weapon or ammunition.

When a weapon fails to fire, the possibility of a misfire or hangfire exists. Therefore, the following precautions must be observed until the round has been removed from the weapon and the cause of the failure determined:

1. Keep the weapon trained on the target and be sure all personnel are clear of the muzzle.
2. Wait 30 seconds from the time the weapon fails to fire before opening the breech for unloading.
3. Exercise extreme caution during unloading procedures; where circumstances permit, either catch the ejected round or reduce the distance of free fall to the ground.
4. After the round has been removed from the receiver, store it separately until you determine whether the round or the firing mechanism is defective. If the round is defective, it must be kept separated from other rounds until it can be disposed of

properly. If examination reveals that the firing mechanism is defective, the round may be reloaded and fired after the firing mechanism has been repaired by the armorer.

4.14.0 Cleaning and Lubricating After Firing

Clean dust, dirt, and mud from all surfaces of the handguard assembly, the sight assembly, and the receiver assembly with a clean, dry cloth. Remove powder fouling from the heat shield of the handguard using RBC. Wipe the inside of the barrel with a cloth soaked in rifle bore cleaner. Remove any deposits or residue inside the barrel by using a bore brush.

Press the barrel latch and move the barrel forward until the barrel stop is engaged. Lubricate the barrel assembly track by applying a light coat of semifluid lubricating oil recommended by the armorer. Wipe all exposed metal surfaces with a cloth saturated with the recommended lubricant. Touch up any scratched or worn surfaces with a solid film of lubricant. Before applying the lubricant, wipe the surfaces with a dry-cleaning solvent to ensure they are thoroughly cleaned of all foreign matter. Separate the upper and lower receiver groups on the rifle. With the launcher cocked, remove the backplate and follower, flush inside the trigger housing with rifle bore cleaner, wipe dry, and lubricate with the recommended lubricant. This action should be done only under the supervision of an armorer.

4.15.0 Grenade Launcher Ammunition

The cartridges (*Figure 11-43*), used with the launcher, are fixed types of ammunition that consist of two major assemblies: the cartridge case and the projectile.

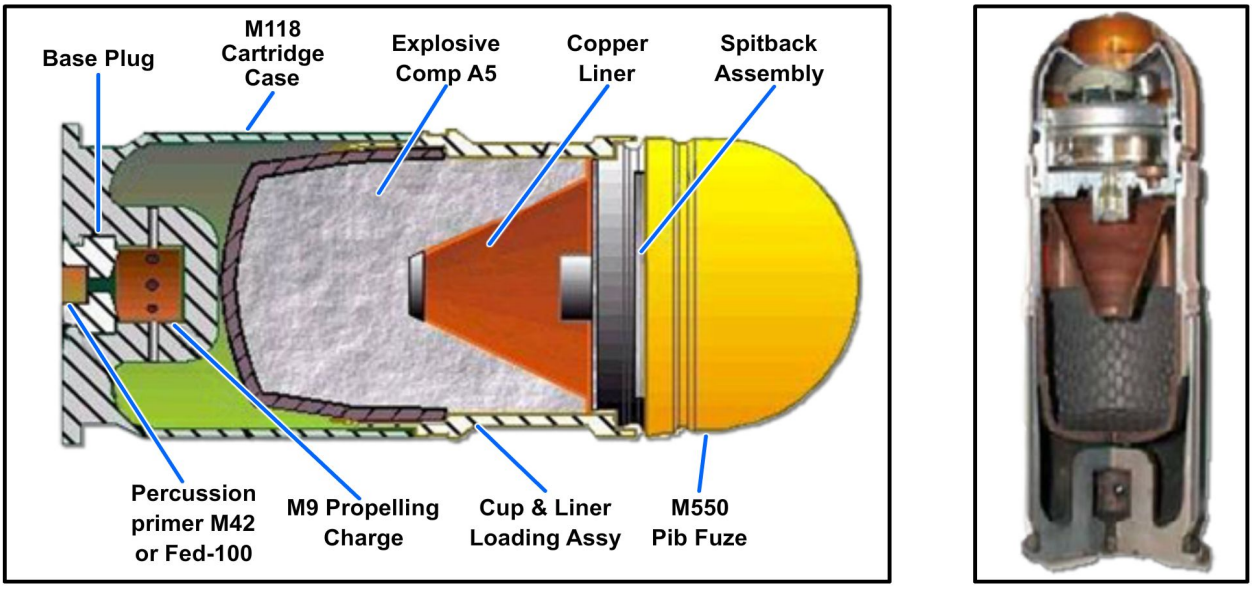


Figure 11-43 — M203 fixed round.

There are eight types of 40mm ammunition used with the launcher:

- High explosive (HE)
- High explosive white star cluster round
- High explosive star parachute round
- High explosive dual purpose (HEDP)
- Ground marker (smoke) round
- Chlorobenzalmalononitrile (CS) tactical round (gas grenade)
- Buckshot
- Training practice (TP)

These cartridges are ready for use as issued. No prior preparation of the rounds is required other than removal from the packing and insertion into the weapon.

4.16.0 Safety Considerations and Warnings

The safety considerations and warnings that should be observed to prevent injury to personnel using the launcher and/or damage to the ammunition are given in *Figure 11-44.*

SAFETY CONSIDERATIONS AND WARNINGS
Do not point muzzle in direction of personnel when loading, clearing, zeroing, or firing grenade launcher. Such action will result in injury to, or death of, personnel.
Do not carry weapon in open position. Weapon must be carried in a closed and locked position with safety on.
Be sure safety is in safe position after loading grenade launcher.
Do not squeeze trigger and remove safety at the same time.
Be in a protected position when firing the grenades at targets within 142 yards (130 m). Do not engage targets within 142 yards (130 m) radius of unprotected friendly troops. **NOTE** Danger radius of the practice grenade is 22 yards (20 m).
Do not fire canopy smoke cartridges so that a falling ignited projectile could descend upon friendly troops, causing injury to personnel and/or damage to material.
Use only authorized rounds. Do not use or fire cartridges other than those authorized for the 40mm M203 grenade launcher. Use of unauthorized high-explosive 40mm cartridges can result in injury or death.
Projectiles assembled with M552 (T333) fuzes will arm within 3 yards (3 m) of weapon. Clear line of fire of all obstructions that will endanger personnel when weapon is fired.
Do not interchange barrel assemblies or components from one weapon to another. Doing so can result in injury to, or death of, personnel.

Figure 11-44 — Safe Handling Warnings for the M203 Grenade Launcher.

Summary

In this chapter, you were introduced to several weapons a Seabee might be called upon to use. Proper operation, cleaning, and use of these weapons are the key to your survival in a combat situation. This manual is by no means the end-all for weapons training. You must complete the proper courses to be qualified to operate these weapons. This Non-Resident Training Course (NRTC) is designed to make you familiar with some of the different weapons available. In this chapter, we have discussed the M16, M9, Mossberg 500, and the M203. These are considered to be small arms that are issued to Seabees. By now, you should be able to identify these weapons and their systems so you will be able to qualify easier and recall information in the future.

Assignment 11

Objectives

1. Specify the correct procedures for clearing, field stripping, and firing an M16 rifle.
2. Point out the correct and safe procedures for preparing ammunition for loading and firing the M16 rifle.
3. Specify the correct procedures for clearing an M16 rifle of stoppages and the immediate action taken.
4. Point out sight adjustments and positions to an M16 rifle.
5. Describe the types and uses of M16 ammunition.
6. Define a misfire and specify the procedures to be used in the care and cleaning of an M16 rifle and its ammunition.
7. Specify procedures in cleaning, field stripping, functioning, loading, firing, and unloading the M9 service pistol.
8. Describe practices in the care and cleaning of an M9 service pistol.
9. Describe the types and uses of 9mm ammunition.
10. Specify procedures in cleaning, field stripping, functioning, loading, firing, and unloading the Mossberg 500 shotgun.
11. Specify procedures for installing an M203 grenade launcher on an M16 rifle.
12. Recognize the steps used in clearing and firing an M203 grenade launcher.
13. Describe the procedure used to correct an M203 grenade launcher misfire and define a stoppage in an M203.
14. Describe the types of ammunition used and the safety precautions to be observed when firing an M203 grenade launcher.

Questions

1. On an M16 rifle, where is the magazine release button located?

    1. Right side of the weapon, top front of the trigger guard
    2. Right side of the weapon, bottom front of the trigger guard
    3. Left side of the weapon, top front of the trigger guard
    4. Left side of the weapon, bottom front of the trigger guard

2. On an M16 rifle, what action must be taken to remove the magazine?

    1. Clear the chamber.
    2. Pull out the magazine.
    3. Depress the magazine release button.
    4. Position the selector lever to SAFE.

3. On the M16 rifle, what actions must be taken to lock the bolt open?

    1. Pull out the charging handle latch with the right hand when the bolt is fully rearward and allow it to lock the bolt open.
    2. Depress the charging handle with the left hand when the bolt is fully rearward, then allow it to lock the bolt.
    3. Pull out the catch when the bolt is fully rearward with the thumb and forefinger of the left hand until it locks the bolt.
    4. Press the bottom of the bolt catch with the thumb or forefinger of the left hand when the bolt is fully rearward until it engages the bolt catch.

4. During assembly/disassembly of an M16, damage to what component is prevented by switching the selector to SAFE?

    1. The automatic sear
    2. The bolt carrier group
    3. The trigger mechanism
    4. The upper receiver assembly

5. A Seabee is authorized to disassemble an M16 to what level?

    1. Detailed
    2. Modified detailed
    3. Field
    4. Modified field

6. On an M16 rifle, where is the takedown pin located?

    1. Behind the pistol grip, on the right side of the weapon
    2. In front of the pistol grip, on the right side of the weapon
    3. Behind the pistol grip, on the left side of the weapon
    4. In front of the pistol grip, on the left side of the weapon

7. While field stripping an M16 rifle, what item(s) should **NOT** be removed by the Seabee?

    1. Extractor spring
    2. Takedown pin only
    3. Receiver pivot pin only
    4. Takedown pin and receiver pivot pin

8. What is the first step in assembling an M16 rifle?

    1. Insert the assembly spring into the lower receiver extension.
    2. Assemble the bolt carrier group.
    3. Replace the handguards.
    4. Make a functional check of the rifle.

9. What condition occurs when you overload the magazine used in an M16 rifle?

    1. A runaway rifle
    2. Bolt gets locked to the rear when loaded
    3. Lips of the magazine become deformed
    4. Spring becomes worn out early

10. What steps should you take to ensure positive retention of the magazine in an M16 rifle?

    1. Rap the magazine sharply with the heel of your hand.
    2. Hold in the magazine release button while inserting the magazine.
    3. Push the magazine in a forward direction until a click is heard.
    4. Insert the magazine while pulling back on the charging handle.

11. When firing an M16, what is a stoppage?

    1. All rounds in the magazine have been expended.
    2. Half of the rounds in the magazine have been expended.
    3. There is an unintentional interruption in the cycle of functioning operation.
    4. The shooter has temporarily suspended firing.

12. What tip color(s) identify a tracer round?

    1. Orange only
    2. Red only
    3. Orange or red
    4. Violet

13. Why should ammunition magazines be kept dry at all times?

    1. To prevent corrosion
    2. To prevent misfiring
    3. To prevent the spring from breaking
    4. To prevent the primer from malfunctioning

14. How many yards is the maximum effective range of the M9 service pistol?

    1. 25
    2. 50
    3. 75
    4. 100

15. When installing the slide group on an M9 service pistol, you must have the safety lock in what position?

    1. SEMI
    2. FULL
    3. FIRE
    4. SAFE

16. While the M9 service pistol is disassembled, what part will be damaged if the hammer is allowed to fall?

    1. Barrel
    2. Receiver
    3. Firing block
    4. Decocking lever

17. What cartridge is used in the M9 service pistol?

    1. 9x19mm
    2. 9x9mm
    3. 19x11mm
    4. 19x19mm

18. What assembly of the Mossberg 500 shotgun houses the cartridge ejector and serves as the support for all major groups and assemblies?

    1. Stock
    2. Receiver
    3. Barrel
    4. Fore-end

19. What is the maximum effective range, in feet, of the Mossberg 500 shotgun using #00 Buck ammunition?

    1. 50
    2. 100
    3. 150
    4. 200

20. When cleaning the barrel bore of the shotgun, brush the chamber and bore from the _____ end of the barrel.

    1. chamber
    2. front
    3. top
    4. front or back

21. What is the first step you should take when performing a safety/function check of a Mossberg 500 shotgun?

    1. Move the safety button to the “on” position.
    2. Clear the shotgun.
    3. Put safety in “off.”
    4. Pull the trigger.

22. When unloading the shotgun, what part should be depressed to release a round from the magazine tube?

    1. Ejection port
    2. Fore-end
    3. Cartridge stop
    4. Action lock lever

23. What is the size, in millimeters, of an M203 grenade launcher round?

    1. 10
    2. 20
    3. 30
    4. 40

24. The leaf sight on an M203 grenade launcher allows the shooter to select (a) what range, and in (b) what increments, in meters?

    1. (a) 100 to 350 (b) 100
    2. (a) 75 to 300 (b) 75
    3. (a) 50 to 250 (b) 50
    4. (a) 25 to 200 (b) 25

25. In what portion of an M203 grenade launcher are the components located that serve to fire or prevent accidental firing?

    1. Barrel and barrel latch
    2. Receiver assembly
    3. Barrel stop
    4. Bolt and bolt housing

26. What procedure must be followed before clearing an M203 grenade launcher?

    1. Remove all live rounds from around the weapon.
    2. Remove any rounds or other obstruction.
    3. Clear the area of all personnel not needed to clear the weapon.
    4. Point the muzzle clear of all personnel within the area.

27. When using an M203 grenade launcher, you should **NOT** engage targets within what radius, in meters, of unprotected, friendly troops?

    1. 80
    2. 90
    3. 100
    4. 105

28. What is a grenade launcher stoppage?

    1. Any interruption in setting the launcher in position
    2. Any interruption in the cycle of operation caused by the weapon
    3. Any interruption in the cycle of operation caused by the operator
    4. Any interruption in the aiming of the launcher

29. What standard “A” type(s) of ammunition is/are used with the grenade launcher?

    1. HE only
    2. HE airburst, HE smokeless, and flashless only
    3. HE, HE airburst, smokeless, flashless, and HEDP only
    4. TP, HE, HE airburst, smokeless, flashless, and HEDP

30. What action must be prevented when firing canopy smoke cartridges?

    1. Giving away position
    2. Causing smoke inhalation
    3. Ignited projectiles from falling upon friendly troops
    4. Extremely explosive charges from going off prematurely

ASSIGNMENT 11

Small Arms Weapons

Directions: Select the correct answer from the list of alternates below each question in the end of chapter assignment. Write in the answer next to the corresponding question number below. Use this answer sheet as a reference to completing the online assignment related to this assignment.

1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

11.	
12.	
13.	
14.	
15.	
16.	
17.	
18.	
19.	
20.	

21.	
22.	
23.	
24.	
25.	
26.	
27.	
28.	
29.	
30.	

Additional Resources and References

This chapter is intended to present thorough resources for task training. The following reference works are suggested for further study. This is optional material for continued education rather than for task training.

Navy Tactical Reference Publication, Force Protection Weapons Handling Standard Procedures and Guidelines, NTRP 3-07.2.2

Rifle Marksmanship, U.S. Marine Corps, MCRP 3-01A

Pistol Marksmanship, U.S. Marine Corps, MCRP 3-01B

Naval Special Warfare, SW370-BB-OPI-010, Operator's Manual for Shotgun, 12-Gauge Mossberg 500A1

Navy, SW 370-AA-OPI-010, 9mm Operator’s Manual, Pistol, Semiautomatic, M9

Trainee Feedback

Center for Seabees and Facilities Engineering (CSFE) makes every effort to keep their courses up-to-date and free of technical errors. If you have a suggestion, found an error or inaccuracy, please write, FAX or email us by using the form below. Use one form for each comment and be sure to fill in the information as accurately and detailed as possible. Thank you for your assistance.

Write: CSFE
NCF Training Division (N7B)
3502 Goodspeed St.
Port Hueneme, CA 93043-4337

FAX: (805) 982-5508 / DSN 551-5508

E-mail: CSFE_CBCH@navy.mil

Trainee Feedback Form

Course: Seabee Combat Handbook, Volume ____, NAVEDTRA: _____

Course Date: _____ Chapter Number: _____ Page: _____

Paragraph: _____ Sentence: _____ Figure: _____ Frame/View: _____

Description: _____
_____
_____
_____
_____
_____

(optional) Corrective action: _____
_____
_____

(optional) Supporting reference(s): _____
_____

Your email address, if a response is requested: _____

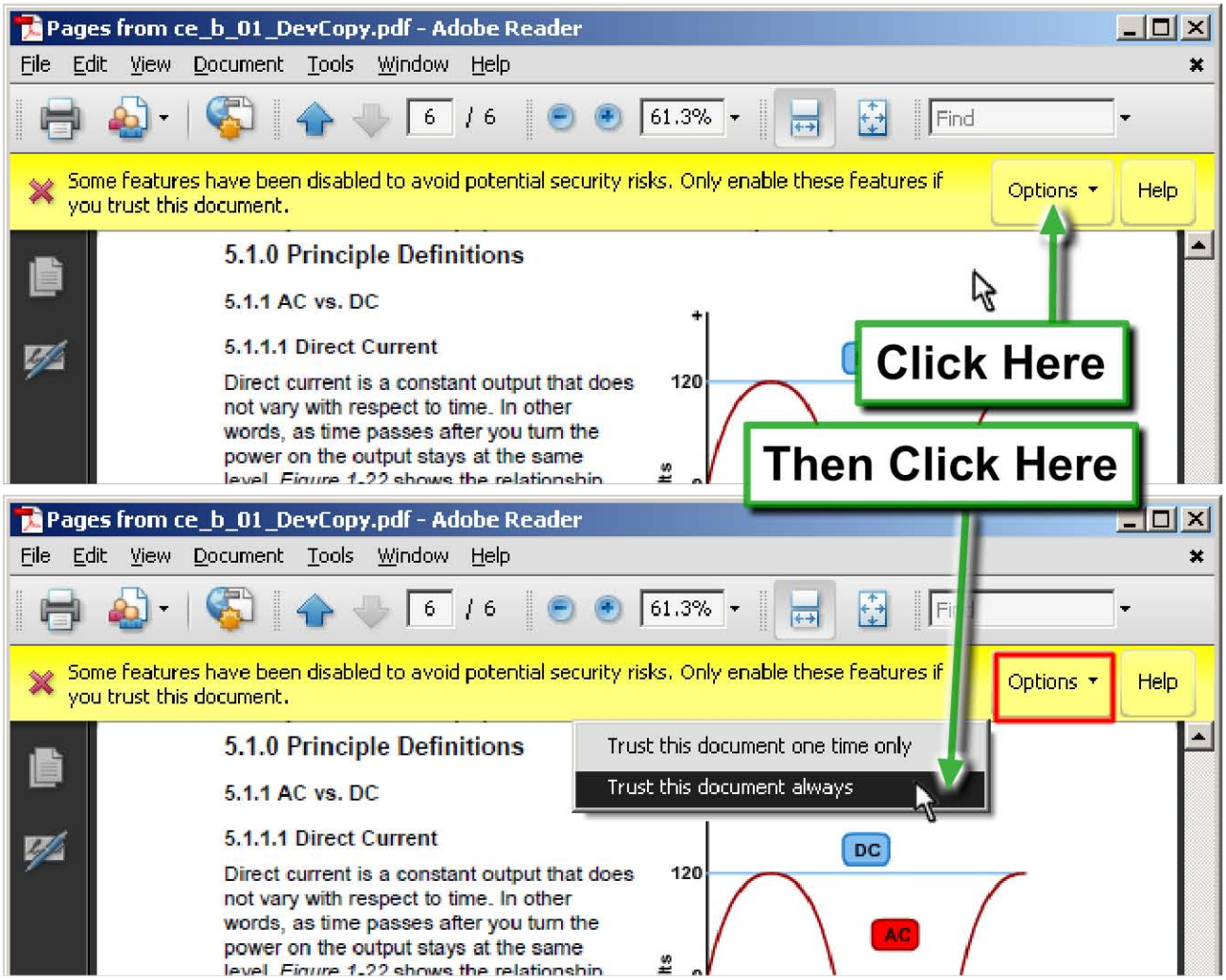
The Interactive features of this manual are currently disabled.

Many graphics will not appear correctly unless these features are turned on. You should either see a popup window, or a yellow banner at the top of the application. To enable the Interactive features of this manual follow the steps illustrated below:

If you see a popup window do the following:



If you see a yellow banner, do the following:



Once you have completed either of the above procedures the features will be enabled for this document, and this warning won't appear again after you leave this page.

Chapter 12

Crew Served Weapons and AT4

Topics

1.0.0 M240B Machine Gun

2.0.0 M2 .50 Caliber Heavy Machine Gun

3.0.0 MK19 MOD 3, 40mm Grenade Machine Gun

4.0.0 AT-4

To hear audio, click on the icon: 

Overview

As a Seabee, you may be called upon to use different weapons to defend an area you are improving. It is important to know what those weapons are and what types of weapons might be available for your use. One category of weapons is called crew-served weapons and another is the light antitank weapon AT4. This chapter will cover the basic and introductory information about Seabee weapons so you can load and fire the M240B machine gun, M2 .50 caliber heavy machine gun, MK19 MOD 3 40mm machine gun, and the AT4.

Objectives

When you have completed this chapter, you will be able to:

1. Recognize the characteristics and data of an M240B machine gun.
2. Specify operating principles of an M240B machine gun, actions taken to correct malfunctions or stoppages, and clearing procedures.
3. Describe the types and uses of M240B machine gun ammunition.
4. Identify principles and techniques of M240B machine gun marksmanship, including obtaining an accurate initial burst of fire, adjusting the fire, manipulating the controls, and developing speed.
5. List characteristics, components, and parts of the M2 .50 caliber heavy machine gun.
6. List characteristics, components, and parts in the disassembly, assembly, and maintenance of the MK19 MOD 3 40mm machine gun.
7. Describe the launcher and cartridge, 84mm M136 (AT4) HEAT lightweight, anti-armor weapon system relative to purpose, use, operation, range, weight and components.

Prerequisites

There are no prerequisites for completing this manual.

Features of this Manual

This manual has several features which make it easy to use online.

- Figure and table numbers are italicized within the handbook text. Figure and table reference numbers are conveniently located next to (or near) the applicable handbook text.
- Audio and video clips are included in the text, with italicized instructions telling you where to click to activate the appropriate link.
- Review questions are included at the end of this chapter as the chapter assignment. To submit assignments log into https://www.courses.netc.navy.mil, go to “Student Services”, in the drop down click on “Active Courses”, go to "View/Submit Answers" next to the course you wish to submit answers for. Assignments may be submitted to the above Web site as they are completed, and instant scoring is available. Your completion letter is available as soon as you pass all assignments.
- A form at the end of each chapter allows your input for improving the manual or correcting errors to be brought to the attention of CSFE’s Technical Review Committee. Your input is important and will help keep this manual up to date and free of technical errors.

1.0.0 THE M240B MACHINE GUN

The M240B medium machine gun, shown in *Figure 12-1*, is an automatic, air-cooled, link belt-fed, gas-operated weapon that fires from an open bolt position. The M240B is capable of being fired from handheld positions or from several types of mounts. The M240B model is designed as a tripod-mounted or bipod-supported machine gun for use by ground forces.



Figure 12-1 — M240B machine gun.

1.1.0 Characteristics of the M240B Machine Gun

Technical characteristics specific to the M240B machine gun are listed in *Table 12-1*.

WARNING

Never mix live ammunition and dummy ammunition.

Table 12-1 — Technical Characteristics of the M240B Machine Gun

WEAPON SPECIFICATIONS	MODEL
	M240B
NSN	1005-01-412-31210
Manufacturer	FN Manufacturing
Mechanism Type	Gas operated, automatic
Magazine Type	M13 disintegrating link belt
Ammo Capacity	100-round linked belt
Weight (empty)	27.1 lb (12.3 kg)
Overall Length	48 in (1219mm)
Barrel Length	24.7 in (627mm)
Muzzle Velocity	2,800 fps (853 mps)
Maximum Effective Range:	
Point Target	2,625 ft (800 m)
Area Target (with mount)	5,906 ft (1,800 m)
Maximum Range	12,221 ft (3,725 m)
Caliber	7.62 x 51mm NATO
Cyclic Rate of Fire (automatic)	650 to 1,050 rounds/min
Cyclic Rate of Fire with Hydraulic Buffer	650 to 1,050 rounds/min

1.2.0 Components

The M240B medium machine gun has eight major common components (*Figure 12-2*), as described in T*able 12-2*.

Table 12-2 — Common Major Components of the M240B

Barrel Assembly *(Figure 12-2, frame 1)*	Houses round for firing and directs projectile
Buffer Assembly *(Figure 12-2, frame 2)*	Absorbs recoil of bolt and operating rod assembly at end of recoil movement
Driving Spring Rod Assembly *(Figure 12-2, frame 3)*	Provides energy for returning bolt and operating rod assembly to firing position
Bolt and Operating Rod Assembly *(Figure 12-2, frame 4)*	Controls feeding, stripping, chambering, firing, extraction, and ejection of rounds using the projectile propelling gas for power
Trigger Housing Assembly *(Figure 12-2, frame 5)*	Controls the firing of the machine gun
Cover Assembly *(Figure 12-2, frame 6)*	Feeds linked belt and holds rounds in position for stripping, feeding, and chambering. The cover assembly has an optical rail sight
Feed Tray *(Figure 12-2, frame 7)*	Serves as a guide for positioning rounds to assist in chambering
Receiver Assembly *(Figure 12-2, frame 8)*	Serves as a support for all major components. Houses action of weapon and controls functioning of the weapon through a series of cam ways

Interaction Available



Figure 12-2 — M240B machine gun components.

1.3.0 Cycle of Operation

It is important to understand the routine cycle of operation to ensure the M240B is readily available for action. There are eight steps in the cycle of operation of the M240B as shown in *Table 12-3*.

Table 12-3 — Routine Cycle of Operation for the M240B

STEP	ACTION
Feeding	Placement of a round in the path of the bolt
Chambering	Pushing of the round into the chamber by the bolt
Locking	Forward movement of driving spring rod assembly returns bolt and operating rod to assembly firing position
Firing	Ignition of the propellant within the cartridge case, which forces the projectile out of the barrel
Unlocking	Rearward movement of bolt and operating rod assembly provides extraction and ejection using projectile propelling gas for power
Extracting	Withdrawal of the cartridge case from the chamber by the extractor
Ejecting	Expulsion of the cartridge case by the ejector
Cocking	Compression of the driving spring rod assembly

1.4.0 Weapon Condition Codes for the M240B Medium Machine Gun

The safety status of the M240B is defined—like other Navy weapons—by one of four weapon condition codes. Weapon condition codes applicable to the M240B are listed in *Table 12-4*.

Table 12-4 — Weapon Condition Codes for the M240

CONDITION	ACTION
1	Ammunition on feed tray, bolt locked to the rear, weapon on safe
2	Not applicable
3	Ammunition on feed tray, bolt forward on empty chamber, weapon on fire
4	Feed tray clear, bolt forward on empty chamber, weapon on fire

1.5.0 Safety/ Function check

To properly perform the safety/function check, conduct the following steps:

1. Place the safety (*Figure 12-3*) to"F."
2. Pull the cocking handle to the rear to lock the bolt back. Return the cocking handle to the forward locked position.

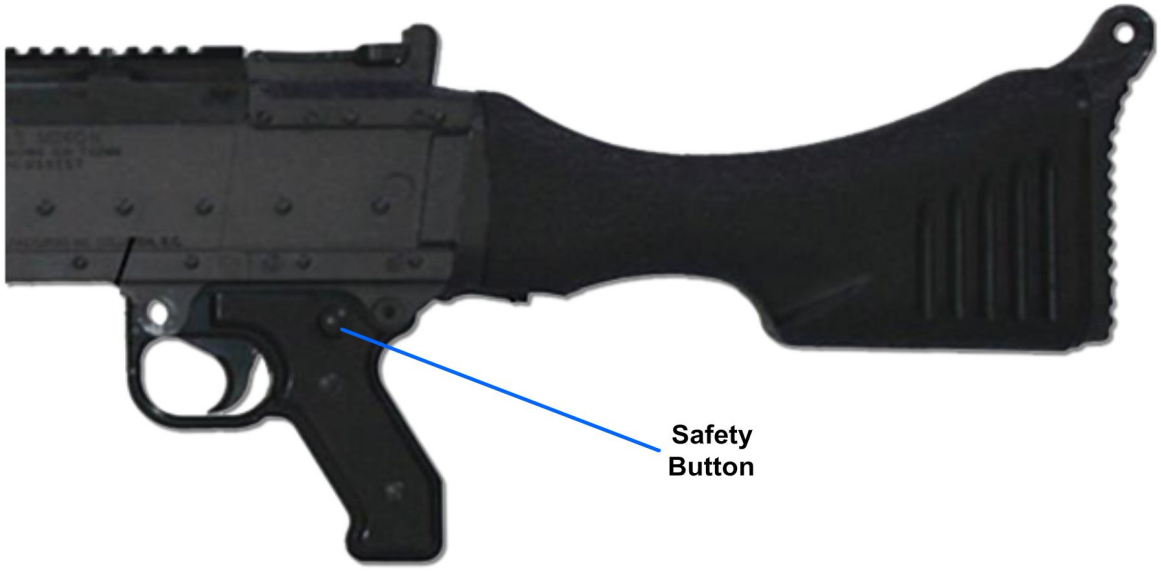


Figure 12-3 — Safety function check.

3. Place the safety to "S."
4. Depress the trigger- nothing should happen.
5. Place the safety to "F."
6. Hold the cocking handle assembly to rear, depress trigger, and ease bolt forward to close and lock.

1.6.0. Loading

To properly perform the loading procedures, conduct the following:

NOTE

Before loading the M240B, check the weapon for dirt, excess oil, and grease. Check the bore to ensure it is free of foreign matter and obstructions. Check the magazine spring for proper tension and to ensure there are no defects.

When ready to load, personnel shall perform the following steps to take the weapon from Condition 4 to Condition 3:

1. Ensure the weapon is in Condition 4.
2. Pull cocking handle assembly to rear. Return cocking handle to forward position.
3. Place weapon on safe.
4. Push in on latches to open cover assembly.
5. Raise feed tray.
6. Check chamber.
7. Lower feed tray.
8. Place weapon on fire.
9. Hold cocking handle to rear, squeeze trigger ride bolt forward to close, and lock.
10. Place link belt in feed tray, with first round against cartridge stop.
11. Close cover assembly. Make sure it locks shut.

⚠ CAUTION ⚠

Make sure round does not move away from cartridge stop during closing and latching of cover.

1.6.1 Procedures to Make Ready

To make MAKE READY the weapon, personnel shall perform the following steps to take the machine gun from Condition 3 to Condition 1:

1. Ensure the weapon is on fire, and pull cocking handle to the rear. Return cocking handle to forward position.
2. Place weapon on safe (if situation permits).
3. Check sight setting.

1.6.2 Procedures to Condition One Load

To successfully load the M240B and place the weapon in CONDITION ONE LOAD, personnel shall perform the following steps to take the weapon from Condition 4 to Condition 1:

1. Ensure the weapon is in Condition 4.
2. Pull cocking handle assembly to rear. Return cocking handle to forward position.
3. Place weapon on safe.
4. Push in on latches to open cover assembly.
5. Raise feed tray.
6. Check chamber.
7. Lower feed tray.
8. Place weapon on fire.

9. Hold cocking handle to rear, squeeze trigger ride bolt forward to close, and lock.
10. Place link belt in feed tray, with first round against cartridge stop.
11. Close cover assembly. Make sure it locks shut.

⚠ CAUTION ⚠

Make sure round does not move away from cartridge stop during closing and latching of cover.

12. Ensure the weapon is on fire, and pull cocking handle to the rear. Return cocking handle to forward position.
13. Place weapon on safe (if situation permits).
14. Check sight setting.

1.7.0 Unloading

To UNLOAD the weapon, personnel shall perform the following steps to take the weapon from any condition to Condition 4:

1. The gunner points the weapon downrange.
2. The gunner ensures the weapon is on fire, pulls the cocking handle to the rear (palm up), and locks the bolt to the rear. The cocking handle is then pushed forward and the weapon placed on safe.
3. The gunner raises the feed tray cover.
4. The assistant gunner removes the ammunition and links from the feed tray.
5. The gunner raises the feed tray and inspects the chamber to ensure that all ammunition has been ejected.
6. Once the chamber and receiver are clear, the gunner closes the feed tray cover.
7. The gunner places the weapon on fire, holds the cocking handle to the rear, squeezes the trigger, and rides the bolt all the way forward.

1.8.0 Malfunctions

A malfunction is a failure of the M240B to function satisfactorily or to perform as designed. A malfunction does not necessarily cause an interruption in the cycle of operation. Three of the most common malfunctions of the M240B are sluggish operation, uncontrolled fire (runaway gun) and cook-offs.

1.8.1 Sluggish Operation

This is normally caused by excessive friction or excessive loss of gas. To remedy sluggish operations, the following steps should be used.

1. Check the gas setting on the gas regulator located on the barrel.
2. Clean, inspect, and lubricate the weapon.

1.8.2 Uncontrolled Fire (Runaway Gun)

Uncontrolled fire occurs when the weapon continues to fire after the trigger is released. Common causes include a worn sear, worn operating rod sear notch, broken sear plunger, and broken or missing sear spring. The following are the actions taken for uncontrolled fire:

1. If there are 20 rounds or less on the belt, hold the weapon on target and fire the remaining ammunition.
2. If there are 20 rounds or more on the belt, break the ammunition belt by twisting it quickly in either direction.
3. When the weapon stops firing, pull cocking handle all the way back and hold. Ensure the weapon is on safe and remove link belt.
4. Clear the weapon and check to find the cause of the malfunction.

WARNING

Never reload a runaway gun until it has been repaired.

1.8.3 Cook-offs

A cook-off is the firing of a round by the heat of a very hot barrel and not by the firing system. Let the weapon cool for 15 minutes before further firing occurs. If nothing is ejected from a hot gun, do not open the cover. Instead, place weapon on safe and keep it pointed downrange. Remain away from the machine gun for 15 minutes. After 15 minutes, clear machine gun. A hot gun typically occurs after 200 rounds have been fired within 2 minutes. However, the ambient temperature in different regions will make a difference in the time required to reach a hot gun state. For example, if it is a hot, sunny day and both the weapon and ammunition are in the sun, a cook-off can occur within 50 rounds.

WARNING

An open-cover cook-off could result in injury or death.

1.9.0 Stoppages

An unintentional interruption in the cycle of operation is referred to as a stoppage. Stoppages are normally discovered when the machine gun will not fire. When a stoppage does occur, prepared personnel must quickly identify and remedy problems to get the machine gun back into action.

NOTE

Many stoppages can be prevented by properly caring for the M240. Proper care includes keeping the weapon clean and well-lubricated.

1.10.0 Remedial Action

Remedial action includes attempting to determine the cause of the malfunction or stoppage. General remedial action steps are as follows:

1. Wait 10 seconds for a possible hangfire.

2. Pull cocking handle rearward, locking bolt to the rear. Return cocking handle to the forward locked position.
3. Check ejection port to see if a cartridge case, belt link, or round has been ejected.
4. If a cartridge case, belt link, or round is ejected, return the cocking handle to its forward position, take aim on target, and attempt to fire. If the weapon still fails to fire, unload and clear it, and then inspect the ammunition and the weapon to determine the cause of the stoppage.

WARNING

If nothing is ejected and the gun is hot (150 rounds fired within a 2-minute period), do not open the cover. Place safety to safe, keep machine gun pointed downrange, and remain away from the machine gun for 15 minutes. After 15 minutes, clear the weapon.

5. If a round is not ejected, place safety to safe or press in on safety.
6. Open the cover, remove ammunition link belt, and raise the feed tray.
7. Inspect the receiver, chamber, ejector, and ammunition.
8. If a round is in the chamber, lower the feed tray and close the cover, and attempt to fire. If there is no round in the chamber, reload and attempt to fire. If the weapon fires, continue to fire. If it does not fire, reapply remedial action as necessary. Inspect the weapon and ammunition.

1.11.0 Ammunition

This is the only ammunition (*Figure 12-4*) authorized for use in the M240B machine gun. If it is not shown, it is not authorized.

Ammunition, which fails to fire, will be disposed of by authorized procedures.

Protect ammunition from mud, sand, and water. If the ammunition gets wet or dirty, wipe it off at once with a clean, dry rag. Wipe off light corrosion as soon as it is discovered. Turn in heavily corroded cartridges.

Do not expose ammunition to direct rays of the sun. If the powder is hot, excessive pressure may be developed when the weapon is fired.

Do not oil or grease ammunition. Dust and other abrasives that collect on greasy ammunition may cause damage to the operating parts of the machine gun. Moreover, oiled cartridges produce excessive chamber pressure.

Do not fire dented cartridges, cartridges with loose bullets, or otherwise defective rounds.

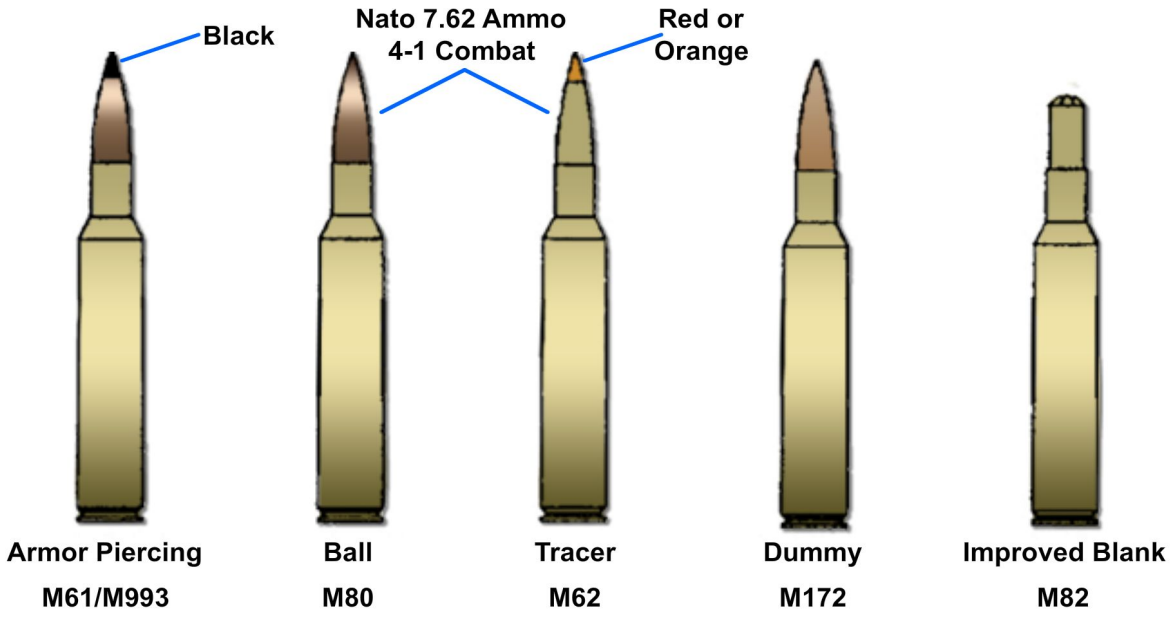


Figure 12-4 — Authorized ammunition.

2.0.0 THE M2 .50 CALIBER HEAVY MACHINE GUN

The M2 .50 caliber heavy barrel, flexible machine gun is a standard weapon used throughout the Navy. The weapon is available with two types of barrels. An aluminum alloy “light” barrel is used for the aircraft version. A “heavy” barrel (HB) is issued for ship and surface craft use. This discussion will be centered on the M2 .50 caliber heavy barrel machine gun M2HB (*Figure 12-5*).

The M2 .50 caliber heavy machine gun is a belt-fed, crew-served, recoil-operated, air-



Figure 12-5 — The M2, .50 caliber heavy machine gun.

cooled weapon. It can be set for automatic and semiautomatic fire. The M2 .50 caliber heavy machine gun does not have any positive safeties.

Ammunition is supplied to the receiver (ammunition feedway) of the gun by a disintegrating metallic link belt. The weapon capable of alternate feed, normally, the machine gun is fed from its left side; but by repositioning certain component parts, the belt may be fed from the right side.

One person can operate the M2 .50 caliber heavy mchine gun. However, two people—the gunner and assistant gunner—are normally used. The gunner actually fires the weapon. The assistant gunner helps to load and reload the ammunition into the receiver. Other personnel (ammunition bearers) can be used to keep the assistant gunner supplied. Speed, skill, and teamwork are important.

Most of the barrel and receiver is exposed to the air to cool the M2 .50 caliber heavy machine gun. Perforations (holes) in the barrel support allow air to circulate around the breech end of the barrel. An HB is used to retard, or slow down, early overheating.

The M2 .50 caliber heavy machine gun has a leaf type of rear sight. It is graduated in both meters and mils for ranges from 100 to 2600 meters and from 0 to 62 mils. A windage knob permits deflection changes of 5 mils right or left of the center. The front sight is a semifixed blade type with a cover.

Because of its size and weight, the M2 .50 caliber heavy machine gun usually needs some type of mounting support. *Figure 12-6, frame 1*, shows the M3 tripod mount arrangement while *Figure 12-6, frame 2,* shows the MK93 Cradle attached to the M3. Other devices or stands may also be used. The primary reason for mounting the weapon is to increase its firing accuracy.



A B

Figure 12-6 — The M3 tripod and MK93 cradle.

2.1.0 Characteristics of the M2

Technical characteristics specific to the M2 are listed in *Table 12-5*.

WARNING

Never mix live ammunition and dummy ammunition.

Table 12-5 — Technical Characteristics of the M2

WEAPON SPECIFICATIONS	
Model	**M2HB Flexible**
NSN	1005-00-322-9715 w/e 1005-00-726-5636
Manufacturer	Saco Inc.
Caliber	0.50
Mechanism Type	Automatic, recoil operated
Magazine Type	Disintegrating link belt
Weight (empty)	84 lb (38 kg)
Overall Length	65.13 in (1,654 mm)
Barrel Length	45 in (1,143 mm)
Muzzle Velocity	3,050 fps (930 mps)
Maximum Effective Range	6,000 ft (1,829 m)
Maximum Range	22,200 ft (6,767 m)
Cyclic Rate of Fire	450–600 rounds/min
Rifling	8 lands, 1 turn in 15 inches, right hand twist

2.2.0 Components

The M2 has eight major components as described in *Table 12-6*.

Table 12-6 — Common Major Components of the M2

Major Components	
Component	**Function**
Barrel Group	Houses cartridges for firing and directs the projectile.
Back plate Group	Houses the trigger, bolt latch release, buffer tube sleeve, and the left- and right hand spade grips.
Driving Spring Rod Assembly	Drives the bolt forward when the bolt latch release is depressed.
Bolt Group	Provides feeding, chambering, firing, and extracting, using the propellant gases and recoil spring for power.
Barrel Buffer Body	Assists in recoil and counter-recoil of the bolt group.
Barrel Extension Group	Secures the barrel to the recoiling parts.
Cover Group	Feeds linked belt ammunition; positions and holds cartridges in position for extracting, feeding, and chambering.
Receiver Group	Serves as a support for all major components; houses the action of the weapon, which controls functioning of the weapon.

Figure 12-7 shows the major component groups and assemblies of the M2 .50 caliber heavy machine gun. For routine cleaning and maintenance, you need to know the general disassembly procedures.

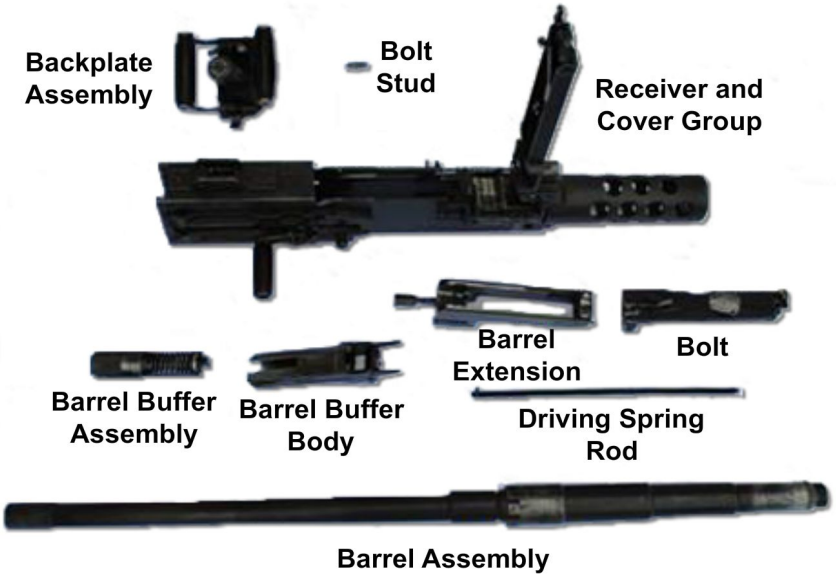


Figure 12-7 — Major components of the M2.

2.3.0 Cycle of Operation

It is important to understand the routine cycle of operation to ensure the M2 is readily available for action. There are eight steps in the cycle of operation of the M2 as shown in *Table 12-7*.

Table 12-7 — Routine Cycle of Operation for the M2

STEP	ACTION
Feeding	Positioning of round in feed tray groove ready for chambering.
Chambering	Pushing of the round into chamber by the bolt.
Locking	Bolt is locked to barrel and barrel extension.
Firing	Ignition of the propellant within cartridge case, which forces the projectile out of the barrel.
Unlocking	Bolt is unlocked from the barrel and barrel extension.
Extracting	Withdrawal of the cartridge case from the chamber by the extractor claw.
Ejecting	Expulsion of cartridge case strikes the ejector, and case is thrown out of the ejection port.
Cocking	Firing pin is withdrawn into cocked position.

2.4.0 Weapon Condition Codes for the M2

The safety status of the M2 is defined by one of four weapon condition codes. Weapon condition codes applicable to the M2 are listed in *Table 12-8*.

Table 12-8 — Weapon Condition Codes for the M2

CONDITION	ACTION
1	Ammunition on feed tray, bolt forward, round in the chamber, cover assembly closed.
2	Not applicable.
3	Ammunition on feed tray, bolt forward on empty chamber, cover assembly closed.
4	No ammunition present on the feed tray, bolt forward on an empty chamber, cover assembly closed.

2.5.0 Operating the M2 .50 Caliber Heavy Machine Gun

The safest and best way to operate the M2 .50 caliber heavy machine gun is to follow established procedures. In doing so, you prevent damage to the gun and injury to yourself and others. The basic operating procedures involve the following steps:

1. Loading
2. Half-loading
3. Full-loading
4. Unloading

2.5.1 Semiautomatic Operation

If single-shot firing is desired, the gun must be set for semiautomatic operation. To do so, you must ensure the bolt latch release is in the up position (or not locked down).

When the bolt latch release is up, the bolt latch assembly is depressed. In this position, the latch assembly can engage notches on top of the bolt when it (the bolt) is to the rear. Thus, when the bolt recoils after a round is fired; it remains locked to the rear.

Depressing the bolt latch release raises the latch assembly. The assembly disengages from the notches on top of the bolt. That allows the bolt to be driven forward into the battery.

To fire the M2 .50 caliber heavy machine gun when set for semiautomatic, depress the bolt latch release and depress the trigger. These two actions must be done for each round fired.

2.5.2 Automatic Operation

If automatic firing is desired, the gun must be set for automatic operation. To do so, ensure the bolt latch release is depressed and locked down. This is done by turning the buffer tube sleeve. The bolt latch release lock is rotated to engage the bolt latch release, locking it down.

When the bolt latch release is locked down, the bolt latch assembly remains in its up position. Thus, when the bolt recoils, it is automatically free to return forward into the battery.

To fire the M2 .50 caliber heavy machine gun in automatic, lock the bolt latch release down and depress the trigger. Short bursts are generally recommended, rather than sustained firings.

2.5.3 Loading Operation

The M2 .50 caliber heavy machine gun is loaded manually. This involves placing an ammunition belt into the receiver of the gun. Ammunition for the M2 .50 caliber heavy machine gune comes prebelted and is shipped in a standard .50 caliber ammunition box.

To load the gun, open and remove the lid on the ammunition box. Then, open and raise the cover group on the gun (*Figure 12-8)*. Insert the double-loop end of the ammunition belt into the feedway of the receiver. Ensure the first cartridge is held by the belt-holding pawl. Close the cover group on the gun and make sure it is latched securely.

If two personnel are operating the M2 .50 caliber heavy machine gun, the assistant gunner loads the ammunition belt. The gunner performs the next two operations—half-loading and full-loading.



Figure 12-8 — Loading the M2.

2.5.4 Half-Loading Operation

Half-loading is a term associated with the M2 .50 caliber machine gun. It can be compared to feeding. Feeding is the first of eight steps in a cycle of operation. It places a round in the receiver just to the rear of the receiver. Do not confuse loading the M2 .50 caliber heavy machine gun (described earlier) with half-loading. The two operations are different.

Half-loading the gun is done after the ammunition belt is installed and the cover group closed. To half-load the gun, the gunner grasps the retracting slide handle, pulls it smartly to the rear, and releases it. At this point, two things can occur. What happens depends on whether the gun is set for automatic or semiautomatic fire.

When the gun is set for automatic fire, the bolt latch release lock holds the bolt latch release down. When the retracting slide handle is released, it and the bolt will go forward. They are driven forward under pressure from the driving spring group. The gun is now half-loaded (in automatic).

When the gun is set for semiautomatic fire, the bolt latch release is up. When the retracting slide handle is released, it—and the bolt—will remain to the rear. To complete the half-load operation, the gunner must do two things. First, the retracting slide handle must be pushed all the way forward. Second, the bolt latch release must be depressed. That unlocks the bolt and it drives forward. The gun is now half-loaded (in semiautomatic).

The M2 .50 caliber heavy machine gun can NOT be fired in the half-loaded operation. Half-loading only places a round into the receiver behind the barrel. The round must be chambered before it can be fired.

2.5.5 Full-Loading Operation

Full-loading a M2 .50 caliber heavy machine gun can be compared to chambering. Chambering was the second of eight steps in a cycle of operation. It places a new round in the chamber of the gun.

To load the gun fully, the half-loading sequence must be repeated. Pull the retracting slide handle to the rear and release it. The weapon is now ready to fire.

2.5.6 Unloading Operation

To unload a M2 .50 caliber heavy machine gun, unlock the bolt release latch (if applicable) and open the cover group. Lift the ammunition belt out of the feedway. Pull the retracting slide handle to the rear and lock the bolt. Look and/or feel to make sure no ammunition is in the gun.

If the weapon is clear, lower the extractor. Release the bolt and ease the retracting slide handle forward. Then lower and secure the cover group. To complete unloading operations, depress the trigger to uncock the firing mechanism.

2.5.7 Cycle of Operation

The first two steps of the eight-step cycle of operation have already been discussed. Initial feeding and chambering are accomplished during the manual half- and full-loading operations. After the first round is fired, feeding and chambering are done by the action of the gun.

The remaining steps in the cycle of operation of a M2 .50 caliber machine gun are summarized below.

1. Locking. – The bolt is locked to the barrel and barrel extension.
2. Firing. – The firing pin is released and driven forward to strike the primer of the cartridge.
3. Unlocking. – The bolt unlocks from the barrel and barrel extension.
4. Extracting. – The empty cartridge case is pulled from the chamber.
5. Ejecting. – The empty cartridge case is ejected from the receiver.
6. Cocking. – The firing pin is withdrawn into its cocked position.

With a loaded chamber, the gun is cocked, and the bolt latch is released. When the trigger is depressed, the trigger bar pivots and releases the cocked firing mechanism.

The spring-loaded firing pin strikes the primer and the cartridge fires. Pressure from the expanding gases causes the recoiling parts of the gun to start moving rearward.

During the first 3/4 inch of rearward travel, the recoiling parts remain locked together. However, the breech lock depressors are acting on the breech lock pin. That action forces the breech lock down and out of the bolt. As a result, at the end of the first 3/4 inch of recoil, the bolt is unlocked. It is free to continue recoiling independent of the barrel and barrel extension.

The barrel extension hits the accelerator. In turn, it hits the bolt and accelerates it (the bolt) to the rear. The barrel and barrel extension recoil another 3/8 of an inch (1 1/8-inch-total travel). They are stopped by the buffer assembly.

Meanwhile, the bolt recoils an additional 6 3/8 inches to the rear (7 1/8-inch-total travel). During this movement, the driving spring group is compressed and the bolt is stopped by the bolt buffer mechanism. The fired cartridge is extracted and the firing mechanism is cocked.

Counter recoil forces the bolt forward and the empty cartridge case is ejected. The bolt locks to the barrel extension and both move forward into the battery. Feeding and chambering have taken place and the gun is ready to fire. The cycle begins when the firing pin is released to set off the next cartridge.

2.5.8 Headspace and Timing Adjustments

The M2 .50 caliber heavy machine gun is a complex working machine. The care and maintenance given this gun are critical for safe and continued operation. In addition to normal lubrication and cleaning practices, checking and adjusting the headspace and timing of the weapon are mandatory.

2.5.8.1 Headspace Adjustment

Headspace is the distance between the face of the bolt and the base of a seated cartridge case. The distance is correct when the following conditions are met:

- The recoiling groups are fully forward.
- There is no independent rearward movement between the bolt, barrel, and barrel extension.

Improper headspace adjustment can cause a lot of problems. It causes the gun to operate improperly and, frequently, causes damage to the weapon or injury to personnel.

Headspace must be checked and set before the gun is fired. Other instances when it must be checked include the following:

- When the gun is assembled
- When the barrel or any major group or assembly within the receiver is replaced
- When there is doubt that correct headspace is set

A special tool is used to check and set the headspace distance. It is called the “headspace gauge” and is part of the headspace and timing gauge set (*Figure 12-9*). The tool should be kept with the gun at all times. This section will only discuss the GO-NO-GO headspace gauge. The following steps explain how to check and set the headspace adjustment:

1. With the cover group closed, cock the gun. Do so by pulling the retracting slide handle all the way to the rear.

2. Depress the bolt latch release and slowly ease the restricting slide handle and bolt all the way forward.
3. Raise the cover group. Pull back on the retracting slide handle slightly. Move the bolt not more than 1/16 of an inch to the rear. This prevents the driving spring group and the weight of the parts from giving a false reading. Raise the extractor.
4. Insert the GO end of the headspace gauge into the T-slot. The T-slot is between the face of the bolt and the rear of the barrel, as shown in *Figure 12-10*. The GO end of the gauge should enter the T-slot freely up to the center ring of the gauge. Remove the gauge and try to insert the NO-GO end into the T-slot. If the NO-GO end does not enter the slot, headspace distance is correct.



Figure 12-9 — M2 headspace adjustment gauge.

If the headspace is too tight, the GO end of the gauge cannot enter the T-slot freely. To correct this situation, take the following steps:

1. Pull back on the retracting slide handle. Do so until the lug on the barrel locking spring is visible through the 3/8-inch hole in the right sideplate.
2. Unscrew the barrel one notch (you will hear a click).
3. Ease the retracting slide handle and bolt fully forward.
4. Retract the bolt slightly, not exceeding 1/16 of an inch. Recheck the headspace adjustment as before.

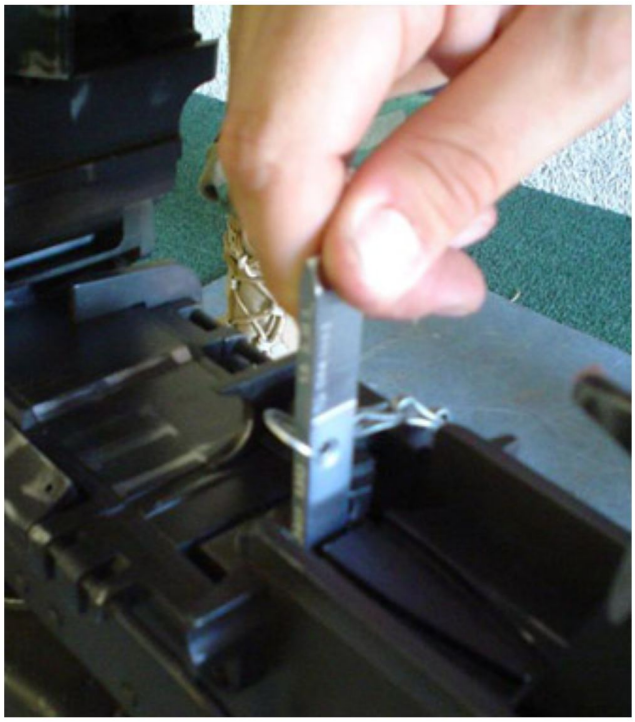


Figure 12-10 — M2 headspace adjustment gauge inserted.

If necessary, repeat this procedure to obtain the proper adjustment. Be sure to unscrew the barrel only one notch (click) each time. If the adjustment cannot be made within one to five (maximum) notches (clicks), notify the maintenance supervisor.

If the headspace is too loose, the NO-GO end of the gauge will enter the T-slot freely. The adjustment procedures for this situation are the same as those just described. However, screw the barrel in one notch (click) at a time for each adjustment attempt.

2.5.8.2 Timing Adjustment

Timing of the weapon is as critical as headspace adjustment. Timing ensures that firing takes place when the recoiling parts are between .020 and .116 of an inch out of the battery. That prevents contact between the front end of the barrel extension and the trunnion block. Timing is correct when the following conditions are met:

1. The recoiling parts are locked together.
2. Firing takes place just before the recoiling parts are in the battery (fully forward).
3. The gun fires on the FIRE gauge and does not fire on the NO-FIRE gauge.

The timing of the gun is checked with the FIRE (.020 inch) and NO-FIRE (.116 inch) gauges. Timing must be checked and/or set each time headspace is adjusted and whenever the timing is questionable. The following steps explain how to check and set the timing adjustment:

1. Ensure the headspace adjustment is correct. If not, correct it before checking the timing.
2. Ensure the firing pin is cocked and the recoiling parts are forward in the battery position.
3. Raise the extractor.
4. Retract the recoiling parts enough to insert the FIRE (.010 inch) gauge. Place it between the barrel extension and trunnion block (*Figure 12-11, frame 1*).



Figure 12-11 — Fire, no-fire gage.

5. Allow the barrel extension to close on the gauge slowly.

Interaction Available

6. Depress the trigger. The firing pin should release. Releasing indicates that the timing is correct (or not late).
7. Retract the recoiling parts enough to remove the FIRE gauge. Cock the gun and allow the recoiling parts to go forward into the battery.
8. Retract the recoiling parts enough to insert the NO-FIRE (.116 inch) gauge. Place it in the same location, between the barrel extension and the trunnion block (*Figure 12-11, frame 2*).
9. Depress the trigger. The firing pin should not release. Its failure to release indicates that the timing is correct (or not early).

If the timing of the gun is late, the firing pin will not release with the FIRE gauge installed. (Refer to Step 6 above.) To correct this situation, perform the following steps:

1. Retract the recoiling parts enough to remove the FIRE gauge. Allow them to return forward into the battery.
2. Remove the backplate assembly.
3. Locate and turn the trigger bar adjusting nut one notch to the right.
4. Reinstall the backplate assembly.
5. Retract the recoiling parts enough to insert the FIRE gauge again. Allow the barrel extension to close on the gauge slowly.
6. Depress the trigger. The firing pin should release.

If necessary, repeat the procedure until the firing pin releases with the FIRE gauge installed.

If the timing of the gun is early, the firing pin will release with the NO-FIRE gauge installed. The adjustment procedures for this situation are the same as those described above. However, turn the trigger bar adjusting nut one notch to the left. Reinstall the NO-FIRE gauge and depress the trigger. The firing pin should not release. Repeat the procedure as necessary.

The importance of obtaining the correct headspace and timing adjustments on the M2 .50 caliber heavy machine gun can NOT be stressed enough. The M2 Operator's Manual (SW 361-AB—MMO-010) and appropriate Maintenance Requirement Cards (MRCs) for the weapon describe the required procedures in detail. Consult those references to make adjustments. Do them carefully and deliberately.

3.0.0 THE MK19 MOD 3 40MM MACHINE GUN

The MK19 MOD 3 (*Figure 12-12*) is a machine gun that fires a variety of 40mm grenades with antipersonnel fragmentation and light antiarmor capability. It fires 40mm grenades at the rate of 325 to 375 rounds per minute. The MK19 MOD 3 is an air-cooled, belt-fed, blowback operated, fully automatic weapon. Because it fires from an open bolt, the MK19 MOD 3 does not “cook off”; the specifications are in *Table 12-9*.



Figure 12-12 — MK19 MOD 3 40mm machine gun.

Table 12-9 — MK19 MOD 3 Weapon Specifications

Model	MK19 MOD 3
NSN	1010-01-126-9063
Manufacturer	Saco Inc.
Mechanism Type	Full-auto blowback
Magazine Type	Ammo can
Ammo Capacity	48 or 32 rounds linked
Weight (empty)	77.6 lb (35.2 kg)
Overall Length	43.1 in (1095mm)
Barrel Length	16.25 in (413mm)
Muzzle Velocity	244 fps (74 mps)
Maximum Effective Range Point Target Area Target	 4,921 ft (1,500 m) 7,257 ft (2,212 m)
Cyclic Rate of Fire	325 to 375 rounds/min
Caliber	40mm, high-velocity

3.1.0 Major Components

The MK19 has six major component groups explained in *Table 12-10* (*Figure 12-13, frames 1-6*).

Table 12-10 — Major components of the MK19 MOD 3

COMPONENT	FUNCTION
Receiver Assembly (*Figure 12-13, frame 1*)	Serves as a support for all major components; ammunition is fed into left side of receiver through feed throat assembly
Feed Slide Assembly and Tray (*Figure 12-13, frame 2*)	Holds rounds in feeder and indexes ammunition into position for delinking
Top Cover Assembly (*Figure 12-13, frame 3*)	Holds feed slide assembly and tray; opened by latch (left side) for loading or to clean and inspect feeder area
Sear Assembly (*Figure 12-13, frame 4*)	Holds receiver sear; trigger action releases sear and allows bolt to go forward; safety is attached to sear assembly
Bolt and Backplate Assembly (*Figure 12-13, frame 5*)	Fires round when sear is depressed by trigger action; recoil springs drive bolt forward on receiver rails; guide rods hold springs in position; trigger and handgrips are located on backplate assembly
Feed Throat Assembly (*Figure 12-13, frame 6*)	Provides smooth feeding of 40mm ammunition; attaches to forward (left side) of receiver by two sets of spring-loaded retaining pins; without feed throat, machine gun stoppages may occur because of twisted or misaligned rounds



Figure 12-13 — MK19 major components.

Interaction Available

3.2.0 Cycle of Operation

There are eight steps in the cycle of operation for the MK19 MOD 3 40mm machine gun. They are incorporated in *Table 12-11*.

Table 12-11 — Cycle of Operation for the MK19 MOD 3

STEP	ACTION
Feeding	Placement of a round in the path of the bolt
Chambering	Pushing of the round into the chamber by the bolt
Locking	Locking occurs as the bolt closes; the mass of the bolt holds the breech momentarily closed
Firing	Ignition of the propellant within the cartridge case, which forces the projectile out of the barrel
Unlocking	Unlocking of bolt occurs after round leaves the barrel and propellant gases force bolt to rear, allowing for extraction
Extracting	Withdrawal of the spent round from the chamber
Ejecting	Expulsion of the spent cartridge case out of and away from the receiver
Cocking	Compression of firing pin spring

3.3.0 Malfunctions

A malfunction is a failure of the MK19 to function satisfactorily or to perform as designed. A malfunction does not necessarily cause an interruption in the cycle of operation.

There are seven common malfunctions of the MK19. These malfunctions and their associated immediate actions are shown below.

3.3.1 Bolt Jammed

1. Place weapon on safe.
2. Press charger handle locks and rotate charger handles down.
3. Pull charger handles to the rear as far as possible. Maintain rearward pressure on charger handles while assistant gunner lifts top cover.

WARNING

The following procedures/steps must be performed in sequence to open top cover. The bolt could spring forward suddenly and fire a round, causing severe injury. Be prepared to catch ejected round.

4. Pull charger handles to rear—without stopping or pausing—until bolt locks, and ensure bolt stays to the rear when releasing charger handles.
5. Insert cleaning rod section through slot in side of receiver. Prepare to catch ejected live round.

6. Raise cleaning rod to force live round down. Catch live round as it is ejected.
7. Remove ammunition belt from feeder.

WARNING

Do not relink any ammunition that has been cycled through the weapon.

8. Reposition ammunition belt in feeder.
9. Place selector lever on fire.
10. Ride the bolt forward by grasping one charger handle and depressing the trigger.
11. Ensure feed slide assembly is to the left.
12. Ensure secondary drive lever is engaged with the feed slide pin. If not, engage forked end with feed slide pin.
13. Close top cover gently.
14. Charge weapon and attempt to fire.
15. If bolt jams, repeat steps 1 through 7. Put weapon on safe and return weapon to the armory.

3.3.2 Bore Obstruction

1. Place weapon on safe. During training, notify the range safety officer immediately.
2. Depress feed pawls; release the ammunition belt, and clear the feed area. Move the ammunition belt and can to a safe area.
3. Remove the empty case catch bag.
4. Charge gun and hold the bolt to rear.
5. While holding bolt to the rear, insert cleaning rod through receiver rail to top of the shell casing as close to the face of the bolt as possible.
6. Place hand underneath as close to the round as possible. Raise cleaning rod upward, forcing the round off the bolt face into the hand. Remove the round to designated area for explosive ordnance disposal.
7. Place selector lever on fire. Ease the bolt forward. Remove the backplate pin, bolt and backplate assembly, vertical cam assembly, and primary drive lever. Check for any type of obstruction.
8. Check for and remove any case or round from the bolt face.
9. Insert bore obstruction detector into bore to check for a live round.
10. Remove obstruction per round removal procedures.

3.3.3 Gun Fires Too Soon

1. Cease fire.
2. Place weapon on safe.
3. Clear area of personnel and ammunition.

WARNING

Do not attempt to clear the weapon if the weapon fires too soon (out-of-battery). Do not attempt to clear or fire the weapon until it is fixed. Follow procedures as given below.

4. Notify range safety officer.
5. Check barrel for lodged round using bore obstruction detector.
6. After weapon has been cleared by proper personnel, send it to armorer.

3.3.4 Runaway Gun (Uncontrolled Automatic Fire)

1. Keep gun pointed downrange and slightly elevated.
2. Press charger handle locks and lower charger handles, and gun will stop.

WARNING

Never try to break the ammunition belt by hand, as serious injury could result. Lower one charger handle to stop gun from firing.

3. Place weapon on safe. Clear weapon.
4. Report the condition to armorer.

3.3.5 Short Recoil

1. Place weapon on safe.
2. Clear area of personnel and ammunition.
3. Notify range safety officer.
4. Pull charger handles to the rear—without stopping or pausing—as far as possible. Maintain rearward pressure on charger handles.
5. Pull charger handles to the rear, without stopping or pausing, until bolt locks. Ensure bolt stays to the rear when releasing charger handles.
6. Insert cleaning rod section through slot in side of receiver. Prepare to catch ejected live round.
7. Raise cleaning rod to force live round down. Catch live round as it is ejected.
8. Raise top cover.
9. Remove ammunition belt from feeder.
10. Check for bore obstruction using bore obstruction detector.

WARNING

When firing HE or TP ammunition, be alert to these three danger signals: (1) a muffled report from the gun, (2) smoke and debris from the bottom of the receiver, or (3) failure of the projectile to leave the muzzle. Gunner should observe downrange and attempt to determine if the round left the barrel. Any of these three signals could mean a bore obstruction.

11. If bore is obstructed, refer to WP 0014 00 for round removal procedures.
12. If there is no obstruction, reposition belt in feeder.
13. Ensure feed slide assembly is to the left.
14. Charge weapon and attempt to fire.
15. If bolt jams, repeat steps 1 through 7. Put weapon on safe and send to armorer.

3.3.6 Sluggish or Erratic Firing

This may be caused by one of the following three problems. Actions to correct each problem are listed below:

1. For dirty bore or chamber, clean bore and chamber.
2. For defective recoil springs or guide rods:
   a. Remove bolt and backplate assembly from weapon. Push against recoil springs to test for weakness.
   b. Report defects to armorer.

WARNING

Be sure bolt is forward before removing backplate pin assembly, or serious injury could result.

3. For bolt sear timing adjustment, send to armorer.

3.3.7 Top Cover Will Not Close

This may be caused by one of the following three problems. Actions to correct each problem are listed below:

1. For improper position of feed slide assembly, move feed slide assembly all the way left. Spring should touch cover.
2. For bolt to rear, ride the bolt forward.
3. For misaligned ammunition, ensure rounds are straight and firmly seated in the feeder. Ensure links are evenly aligned in the link guide and on rounds. Clean any dirt from feeder.

3.4.0 Stoppages

An unintentional interruption in the cycle of operation is referred to as a stoppage. Stoppages are normally discovered when the machine gun will not fire. Stoppages of the MK19 may be caused by faulty ammunition, improper function of the weapon, or shooter error. When a stoppage does occur, prepared personnel must quickly identify and remedy problems to get the machine gun back into action. The four procedures that follow provide specific actions necessary to effectively respond to common stoppages.

3.4.1 Misfire

During peacetime and training, attempt to determine the cause of the stoppage using the following procedures:

1. Clear the area of personnel.
2. Wait 10 seconds for hangfire.
3. Place weapon on safe.
4. Clear the weapon.
5. Catch any live round as it is ejected.
6. Put weapon on safe and check for bore obstruction. If bore is clear, move safe to fire position and attempt to fire.
7. If weapon does not fire, repeat steps 2 through 6 and have weapon inspected by an armorer.

In combat situations only, use the following procedures:

1. Press charger handle locks and rotate charger handles down.
2. Pull charger handles to the rear until the bolt sears.
3. Push charger handles forward and rotate charger handles up until they lock.

NOTE

Both charger handles must be forward and up for firing. If either handle is down, the weapon will not fire.

4. Aim weapon on target and fire.
5. Turn in live round as instructed by current directives.

WARNING

Do not use combat misfire procedures during peacetime or training. Serious injury can result if precautions are not observed.

Do not relink or fire ammunition that has been cycled through the weapon.

3.4.2 Bad Ammunition

1. If the primer is indented but round did not fire, dispose of round as authorized.
2. If the primer is not indented, check the firing pin.
3. If the round is on the bolt face, remove from bolt face. If the round is not on bolt face, leave the bolt in rear position and the gun on safe.

3.4.3 Ammunition Jammed in Feeder

1. Put gun on safe. Check for proper attachment of feed throat. If charging is not possible, follow the procedures for a jammed bolt.
2. If the rounds are crooked or not seated firmly, remove linked ammunition from feeder, ensure link band is even and adjacent to copper band for all ammunition, and reload.
3. For a broken link:
    a. If within weapon, remove link.
    b. On ammunition, remove round and dispose of as authorized.
    c. If the link is off the rotating band, remove round from belt, dispose of round as authorized, and reload.
    d. Ensure female link is first.

3.4.4 Bad Firing Pin

1. If the primer on the ejected round is not indented, check the firing pin/spring.
2. If the firing pin tip fails to spring forward, report the defect to the armorer.

3.5.0 MK19 MOD 3 40mm Grenade Machine Gun Safe Operation Procedures

This section provides the information necessary to understand the conditions of safety, readiness, and operation specific to the MK19 MOD 3 40mm grenade machine gun. The standardized procedures included in this section, when consistently applied, will maximize safety during weapons handling and promote the effective employment of this weapon.

3.5.1 Weapon Condition Codes for the MK19 MOD 3 40mm Grenade Machine Gun

The MK19's safety status is defined, like other Navy weapons, by one of four weapon condition codes. Weapon condition codes applicable to the MK19 are defined in *Table 12-12*. The MK19 will be kept in Condition 1 during normal security operations.

Table 12-12 — Weapon Condition Code for the MK19 MOD 3

CONDITION	ACTION
1	Bolt locked to the rear; no round in the chamber; ammunition in the feeder; round on the bolt face; cover assembly closed and latched; weapon on safe
2	Not applicable
3	Bolt locked to the rear; no round in the chamber; ammunition in the feeder; no round on the bolt face; cover assembly closed and latched; weapon on safe
4	No round in the chamber; no ammunition in the feeder; bolt forward; cover assembly closed and latched; weapon on safe

3.5.2 Weapon Handling Commands for the MK19 MOD 3

Weapon handling commands are issued by a supervisor in the chain of command to direct the loading, unloading, and employment of any weapon. The commands set forth in *Table 12-13*—when consistently and properly used—should result in safe and proficient handling of the MK19.

Table 12-13 — Weapons Handling Commands for the MK19 MOD 3

COMMAND	ACTION
Load	Take the weapon from Condition 4 to Condition 3
Make Ready	Take the weapon from Condition 3 to Condition 1
Fire	Engage the target
Cease Fire	Cease engagement of the target
Unload	Take the weapon from Condition 1 or 3 to Condition 4
Unload, Show Clear	With a second individual, check the weapon to verify that no ammunition is present before the weapon is put in Condition 4

3.6.0 MK 93 MOD 2 Gun Cradle and M3 Tripod

The MK 93 MOD 2 gun cradle (*Figure 12-14*) attaches to the M3 tripod and a variety of vehicle mounts. The MK 64 holds the gun and allows it to traverse and elevate on the vehicle or tripod. It also features a travel lock that holds the weapon in travel position during vehicle operation.

Weight . . . . . 21 pounds

Length . . . . . 17.5 inches

Height . . . . . .9.5 inches

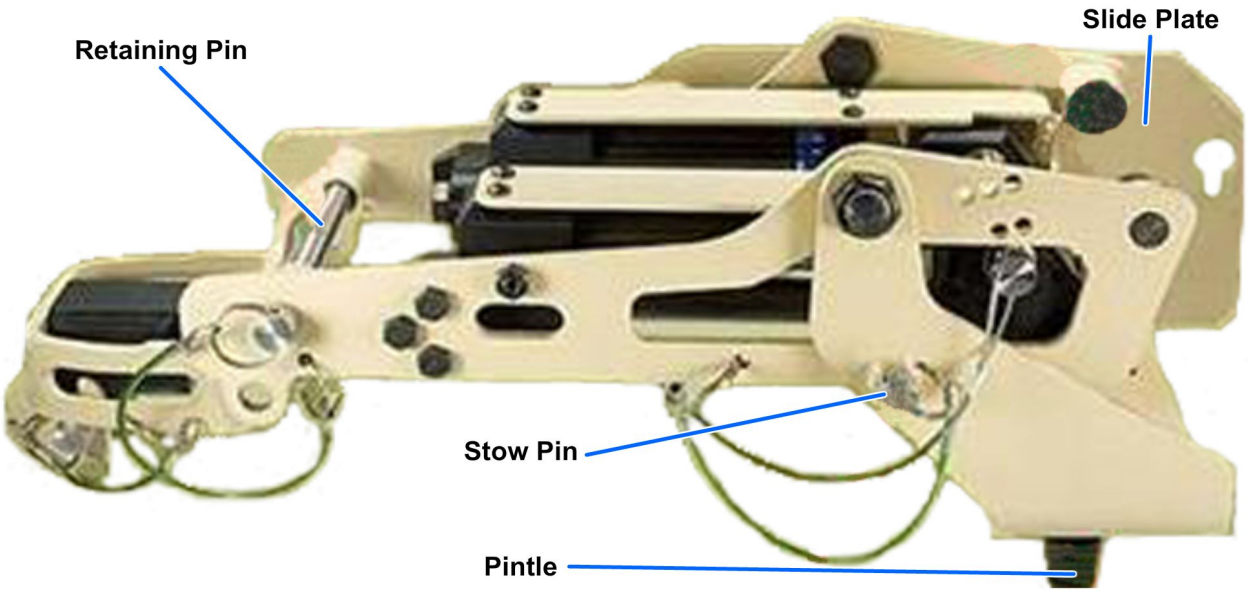


Figure 12-14 — MK 93 MOD 2 gun cradle and M3 tripod.

3.7.0 Ammunition

The ammunition for the MK 19 MOD 3 40mm machine gun is explained below.

3.7.1 M383 HE Round

An HE grenade (*Figure 12-15, view A*)

Designed to inflict personnel casualties

Arming Distance: 18 to 36 meters

Wound Radius: 15 meters

3.7.2 M385E4/M385AI TP Rounds

TP, inert rounds with a propelling charge (*Figure 12-15, view B*)

Muzzle Velocity: 244 mps

Maximum range: 2200 meters

3.7.3 M918 TP Round

A target practice round with flash signature (*Figure 12-15, view C*)

Muzzle Velocity: 244 mps

Maximum Range: 2200 meters

Arming Distance: 18 to 30 meters

3.7.4 M922 Dummy Round

Totally inert (*Figure 12-15, view D*)

Used to check gun functioning and for gun crew training

3.7.5 M430 High Explosive Dual-Purpose (HEDP) Round

An HE, Dual-Purpose grenade (*Figure 12-15, view E*)

Arming Distance: 18 to 30 meters

Kill Radius: Approximately 5 meters

Wound Radius: Approximately 15 meters

Muzzle Velocity: 244 mps

Maximum Range: 2200 meters

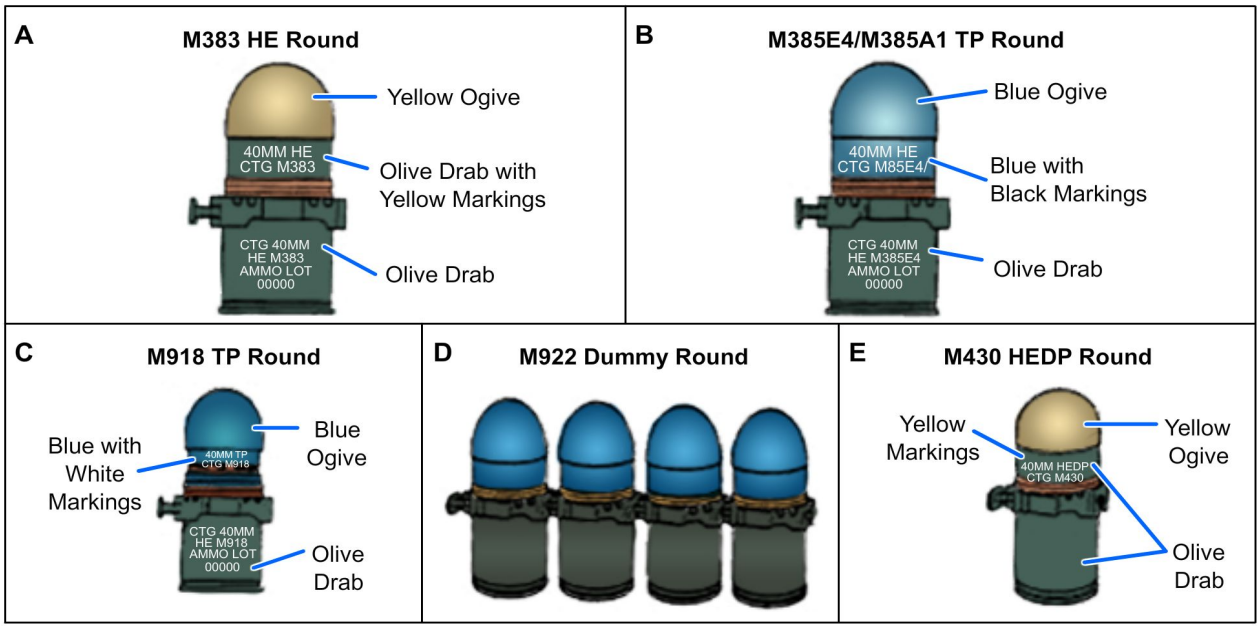


Figure 12-15 — MK19 MOD 3 ammunition.

4.0.0 LAUNCHER AND CARTRIDGE, 84MM, M136 (AT4), HEAT

The launcher (*Figure 12-16, frame 1*) and cartridge (*Figure 12-16, frame 2*), 84mm, M136 (AT4), HEAT, is a lightweight, self-contained antiarmor weapon. It consists of a free-flight; fin-stabilized cartridge packed in an expendable launcher. It is issued as a round of ammunition and requires minimum operator maintenance. The launcher serves as a watertight packing container for transportation and storage; however, when the launcher is placed in the firing position, it serves to ignite and guide the rocket on its initial flight toward the target. Once fired, the launcher is designed to be discarded.



Figure 12-16 — AT-4 launcher and cartridge, 84mm, M136.

The AT4 is designed to withstand arctic, tropic, and desert conditions or any combination of natural environments. It may be used under conditions of limited visibility. Target engagement, however, is limited by the ability of the shooter to detect and identify the target visually and to determine the range to the target.

Interaction Available

4.1.0 Launcher

The launcher is a one-piece, disposable, fiberglass wrapped tube. The launcher has the following components affixed to it (*Figure 12-17*).

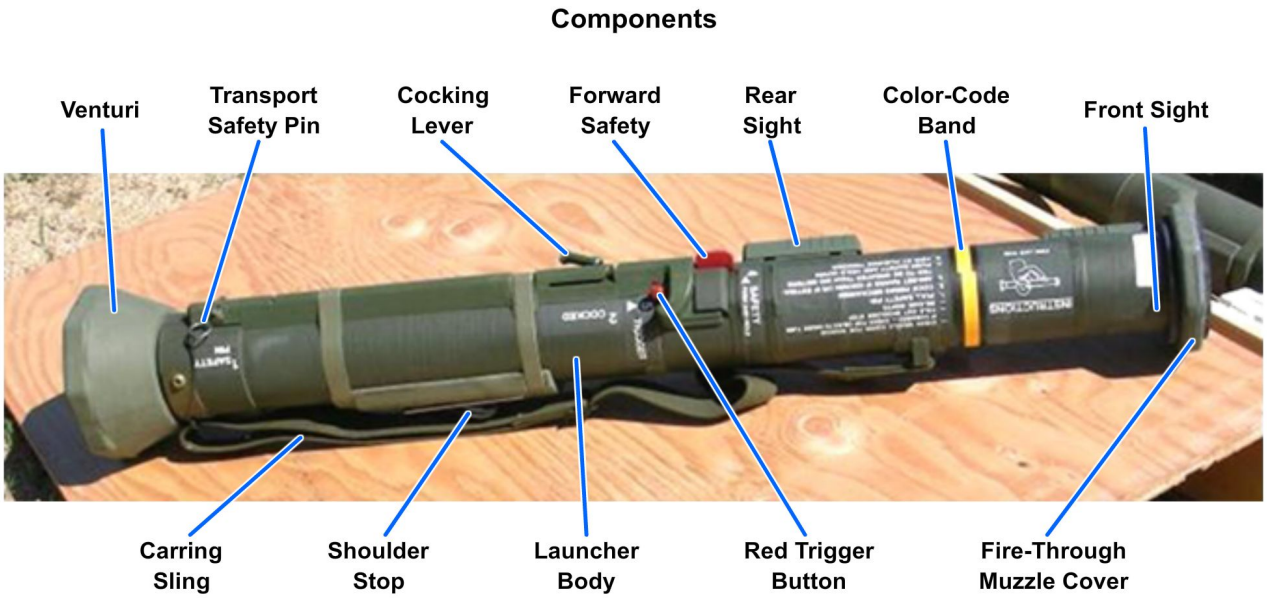


Figure 12-17 — AT-4 launcher.

- Transport Safety Pin – Provides safety for transporting. It is attached to the launcher by a lanyard
- Cocking Lever – Cocks firing mechanism
- Fire-Through Muzzle Cover – Keeps out moisture and prevents foreign objects from entering the muzzle
- Color-Code Band – Indicates type of cartridge
- Sights
    1. Front – Consists of a sight blade, center post, and right and left lead posts
    2. Rear – Consists of a sight blade, range setting knob, range indicator, 2mm peephole, and 7mm peephole
- Venturi – Performs two functions:
    1. Protects the weapon from damage if dropped
    2. Directs the flow of the backblast
- Forward Safety – Must be fully depressed and held before pressing trigger button or launcher will not fire
- Red Trigger Button – Fires the weapon
- Shoulder Stop – Helps stabilize the launcher on the shoulder
- Carrying Sling – Provides a means for carrying the launcher
- Firing Mechanism

Launcher Technical Data

Weight: Overall system: 14.8 pounds; Cartridge: 4 pounds

Caliber: 84mm

Length: 40 inches

Muzzle Velocity: 950 feet per second

Range: Maximum range: 2100 meters or 6,890 feet

Maximum effective range: 300 meters or 985 feet

Minimum arming range: 10 meters or 33 feet

4.2.0 Sights

The front sight (*Figure 12-18*) consists of a sight blade with a center post and left and right lead posts. It has a semicircular white line to aid in obtaining the proper sight picture. To open the front sight cover, press down on the sight cover and slide it rearward.

The rear sight (*Figure 12-18*) consists of a sight blade, range setting knob, range scale, 2mm peephole (for normal light conditions), and 7mm peephole (for limited visibility). To open the rear sight cover, press down on the cover and slide it forward.

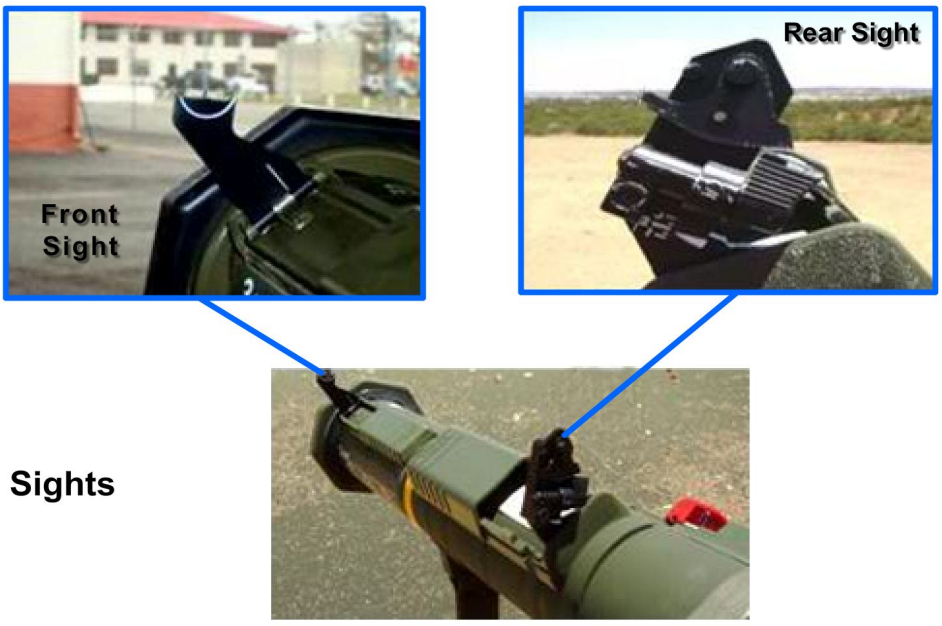


Figure 12-18 — AT-4 sights.

4.3.0 Controls

The firing mechanism is mechanical (*Figure 12-19*). It includes the red trigger button, the enclosed firing rod with firing rod spring, and three safety devices. The red trigger button is located forward of the cocking lever just behind the forward safety. The weapon cannot be fired unless the three safety devices have been disengaged.

Firing Mechanism and Safety Features

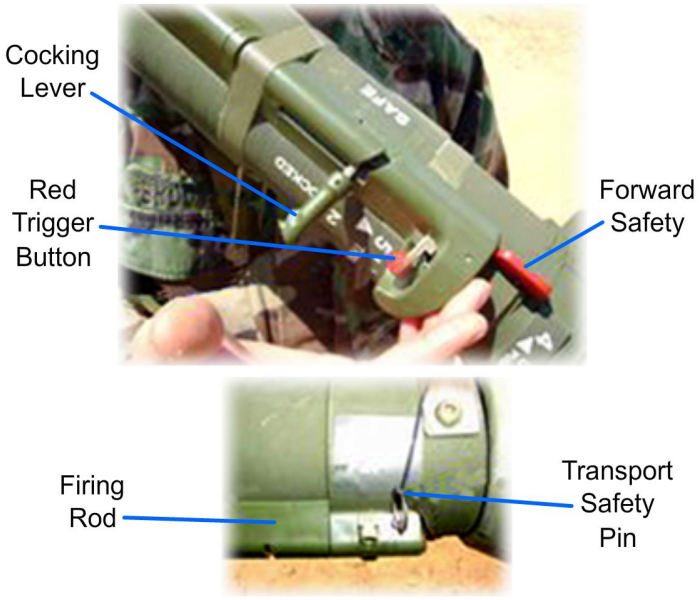


Figure 12-19 — Firing controls and safety mechanisms.

1. Transport Safety Pin – The transport safety pin blocks the movement of the firing pin and prevents it from striking the cartridge percussion cap. To disengage the transport safety pin, pull it out and release.
2. Cocking Lever – The cocking lever is attached to the firing rod. When the cocking lever is in the SAFE position, there is no contact between the firing rod and the trigger. To cock the AT4, push the cocking lever forward and down with the thumb of your right hand. When the weapon is cocked, the firing rod is engaged with the trigger through the hooks on the front part of the firing rod and red trigger button.
3. Forward Safety – The forward safety is located on the forward end of the firing mechanism. The forward safety is connected to a steel rod that prevents the firing rod from striking the firing pin. The forward safety must be fully depressed and held down before the launcher can be fired.

4.4.0 Inspection before Firing

Since the AT4 is issued as a round of ammunition, rather than as a weapon, the launcher is completely sealed. Inspection is limited to visual examination of the external components. The launcher is waterproof. When the fire-through muzzle cover is intact, the launcher remains waterproof until fired. The overall condition of the launcher should be inspected before being used (*Figure 12-20*).

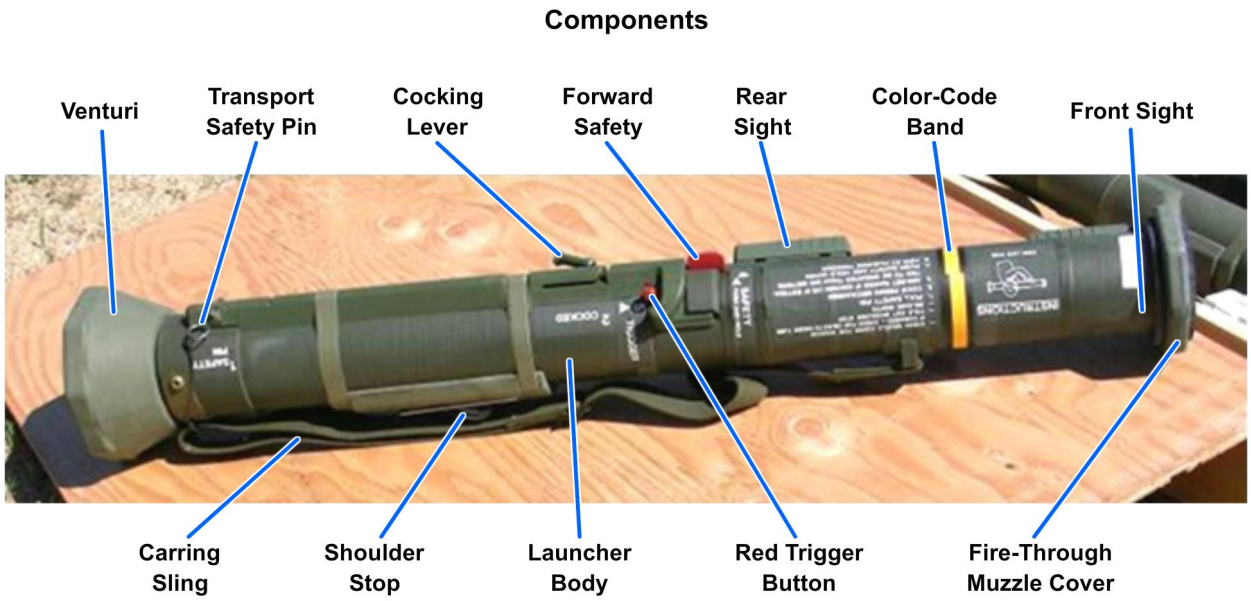


Figure 12-20 — AT4 launcher inspection.

The user should ensure that the following areas are inspected:

- Transport safety pin is in place and fully inserted. The lanyard is attached.
- The cocking lever is in the SAFE position and folded down.
- The fire-through muzzle cover is intact. If the seal is ruptured or torn, cut the seal out to ensure there are no foreign objects inside the launcher tube. To remove foreign objects, turn the tube muzzle down and shake it gently. Before firing, ensure there are no foreign objects in the muzzle.
- The launcher being used has a black color-code band with a yellow band inside.
- The sights function properly. Open the covers to see if the sights pop up and are not damaged.
- The forward safety does not move when depressed.
- The rear seal is not cracked or damaged. The rear seal is inside the venturi and is made of brown Plexiglas. Before firing, ensure there are no foreign objects obstructing the rear of the launcher.
- The shoulder stop is not broken or damaged, and it unsnaps and folds down.
- The carrying sling is not frayed and is attached firmly to the launch tube.
- The launcher body has no cracks, dents, or bulges.
- The red trigger button is not missing, broken, or damaged.

4.5.0 Operation

The following procedures are used to prepare the AT4 for immediate firing:

WARNING

Be sure earplugs are inserted. Keep weapon pointed toward the target. Keep backblast area clear.

1. Remove the launcher from the carrying position and cradle it in your arms (*Figure 12-21, frame 1*).
2. Remove the transport safety pin by pulling it out with your right hand and releasing it (*Figure 12-21, frame 2*).

NOTE

Be sure that the transport safety pin is attached to the lanyard and the lanyard is attached to the launcher. If it is not, retain the transport safety pin (it must be reinserted if the launcher is not fired).

3. Unsnap the shoulder stop and unfold it (*Figure 12-21, frame 3*).
4. Release the sights. Release the front sight (*Figure 12-21, frame 4*) by pressing down on the sight cover and sliding the cover to the rear. Release the rear sight by pressing down on the rear sight cover and sliding the cover to the front. Each sight pops up after release procedures (*Figure 12-21, frame 5*).
5. Place the launcher on your right shoulder.



Figure 12-21 — Operation of the AT-4.

Interaction Available

WARNING

Keep weapon pointed toward target. Check backblast area.

6. Adjust the rear sight (*Figure 12-22, frame 1*). When uncovered, the rear sight is preset on 200 meters, which is the battle-sight setting. During target engagement for targets more than 200 meters, a sight adjustment is necessary; for targets less than 200 meters, no adjustment is necessary. The sight is adjustable below 200 meters; however, because of the flight dynamics of the projectile, adjusting the range setting does not increase the hit probability for targets less than 200 meters.
7. Press the shoulder stop against your shoulder (*Figure 12-22, frame 2*). For added stability, grasp the carrying sling near the muzzle with your left hand and pull back on the carrying sling until the shoulder stop is snug against your shoulder.
8. Cock the launcher (*Figure 12-22, frame 3*) by unfolding the cocking lever with your right hand. Place your thumb under the cocking lever and, with the support of your fingers in front of the firing mechanism, push the cocking lever forward and then downward to the right. Let the cocking lever slide back.

CAUTION

Do not refold the cocking lever. This will interfere with the function of the firing mechanism.



Figure 12-22 — Operation of the AT-4, cont.

Interaction Available

9. Using the index and middle fingers of your right hand, press the forward safety all the way to the left and hold it (*Figure 12-22, frame 4*). At the same time, pull the launcher into your shoulder with your left hand, keeping your right hand against the forward edge of the firing mechanism housing for firing stability.
10. To fire the launcher, press the red trigger button by gently applying pressure straightforward with the tip of your right thumb in a steady, smooth movement (*Figure 12-22, frame 5*). When the launcher is prepared for firing, but is not fired, it is taken out of operation by releasing the forward safety.

NOTE

The trigger for the AT4 is a red button on the right side of the tube. To fire the launcher, you must apply pressure straight forward with the thumb of your right hand in a steady, smooth movement. Proper trigger manipulation can be developed by dry-fire practice with an expended AT4 or AT4 training devices.

11. Return the cocking lever to the SAFE, uncocked position by reversing the procedures for cocking, and then fold the cocking lever down.
12. Remove the launcher from your shoulder. Keep it pointed toward the target.
13. Reinsert the transport safety pin all the way into the pinhole.
14. Return the rear sight to the battle-sight setting of 200 meters; fold down the front and rear sight; close the sight covers.

⚠ CAUTION ⚠

Rear sight may be damaged if it is not returned to the battlesight setting (200 meters) before closing the sight cover.

15. Refold the shoulder stop and snap it back into position; sling the launcher over either shoulder with the forward (muzzle) end down.

4.5.1 Aiming

In general—to aim the launcher—the shooter must first estimate the range to the target. Once the range is determined, the launcher is placed in position on the right shoulder so the right eye is 2 1/2 to 3 inches from the rear sight. The shooter is concerned with correctly pointing the AT4 so the cartridge hits the target when fired. To do this, the shooter must have the rear sight, the front sight posts, and the target (or aiming point) in proper relationship—known as the sight picture. A correct sight picture is obtained when the sights are properly aligned and the aiming point (target) is in correct relationship to the front sight posts.

4.5.2 Misfire Procedures

A misfire is a complete failure to fire and may be caused by a faulty firing mechanism or by an element in the propelling charge explosive train.

⚠ CAUTION ⚠

Keep the weapon pointed toward the target.

4.5.2.1 Misfire Procedures (Training)

1. When the launcher fails to fire, immediately shout, “Misfire.”
2. Maintain the original sight picture.
3. Release the forward safety.
4. Recock the cocking lever. Check the backblast area; aim, fully depress, and hold down the forward safety; and press the red trigger button.
5. If the launcher still fails to fire, repeat Steps 1 through 4.
6. If the launcher still fails to fire, release the forward safety and return the cocking lever to the SAFE, uncocked position.
7. Take the launcher off your shoulder; keep the muzzle pointed toward the target.
8. Reinsert the transport safety pin.
9. Wait 2 minutes, and then carefully lay the faulty launcher on the ground, muzzle facing toward the target.
10. Notify the Range Safety Officer (RSO) to dispose of faulty launcher according to standard operating procedures (SOPs).

4.5.2.2 Misfire Procedures (Combat)

1. Release the forward safety. Immediately recock the cocking lever. Check the backblast area; aim, fully depress, and hold down the forward safety; and press the red trigger button.
2. If the launcher still does not fire, maintain your firing position, and return the cocking lever to the SAFE position. Remove the launcher from your shoulder and reinsert the transport safety pin. Lay the faulty launcher aside; keep the muzzle pointed toward the target. Immediately use another launcher to engage the target. Dispose of or destroy the faulty launcher according to SOPs.

4.6.0 Firing Positions

The AT4 is fired from the right shoulder only. It may be fired from the standing, kneeling, sitting, or prone position. The exact position may vary slightly to allow for the configuration of an individual’s body. Any of these positions are suitable for stationary targets. In general, the most suitable positions for engaging moving targets are standing and kneeling. Situation, terrain, and gunner preference should govern the selection of the best position. Whenever possible, support should be used to stabilize the gunner’s aim.

4.6.1 Standing Position

The standing position (*Figure 12-23*) is similar to that of firing a rifle. Face the target, execute a half-right face, spread your feet a comfortable distance apart, and place the launcher on your right shoulder; your body should be well-balanced with your hips level. Your left hand should be directly under the front of the launcher, grasping the carrying sling. Your left elbow should be placed against your body for stability. Grasp the firing mechanism with your right hand and keep your right elbow placed tightly against the body.



Figure 12-23 — Standing position.

- Advantages – There is freedom of movement for tracking targets and good visibility.
- Disadvantage – You are a good target.

4.6.2 Kneeling Position

The kneeling position (*Figure 12-24, view A*) is similar to the kneeling supported position for firing a rifle. To assume this kneeling position, first assume the standing position. Kneel on the right knee and point your left leg toward the target. Keep your left foot at a right angle to and opposite your right knee, forming a right angle to the ground with your left leg. Sit back on your right heel, while shifting the weight forward. Rest your left elbow just forward of your left knee. Avoid bone-to-bone contact. Hold your right elbow firmly against your body.

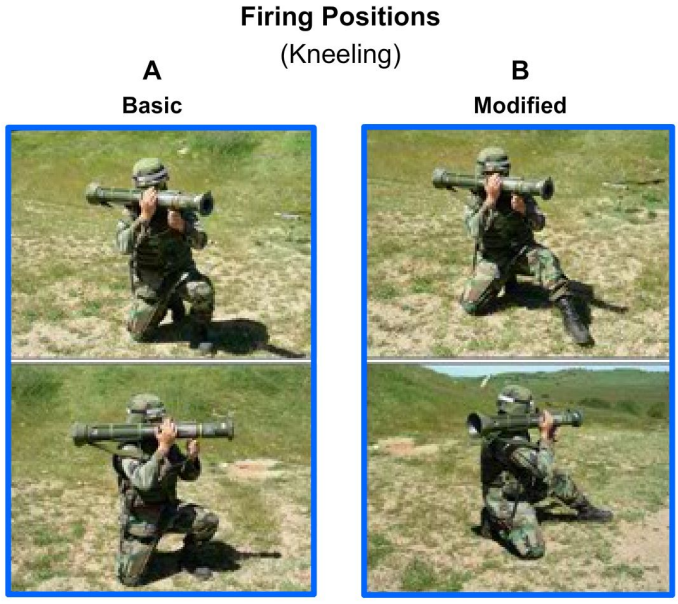


Figure 12-24 — Kneeling positions.

- Advantage – This is a stable firing position.
- Disadvantage – There is limited movement for tracking.

4.6.3 Modified Kneeling Position

The modified kneeling position (*Figure 12-24, view B*) is the best for tracking moving targets. To get into this position for engaging moving targets, first assume the standing position. Kneel on your right knee, keeping the thigh of your right leg vertical. Keep your buttocks and back straight. Point your left leg toward the target, keeping your left foot at a right angle to

and opposite your right knee. Keep your left thigh parallel to the ground. Keep your elbows tucked against your sides.

- Advantage – There is freedom of movement for tracking.
- Disadvantage – This is an unstable firing position.

Use either position when firing at stationary or moving targets; however, the modified version allows tracking similar to the standing position. Maximum use of protective barriers and supported positions is essential with the kneeling positions to increase stability and reduce vulnerability.

4.6.4 Sitting Position

There are two sitting positions that are suitable for firing at stationary targets and are more stable than the kneeling positions.

1. For the sitting position (*Figure 12-25, frame 1*), keep the launcher pointed toward the target and execute a half-left face. Sit with your legs crossed, and place the launcher on your right shoulder. Place your right hand on the firing mechanism and grasp the carrying sling with your left hand. Lean slightly forward from the hips, and rest your elbows forward of your knees to avoid bone-to-bone contact.
2. To assume the modified sitting position (*Figure 12-25, frame 2*), keep the launcher pointed toward the target and execute a half-left face. Sit with your legs partly extended and well apart; place the launcher on your right shoulder. Dig your heels into the ground. Rest your elbows forward of your knees to avoid bone-to-bone contact.



Figure 12-25 — Sitting position.

- Advantages – This is a stable firing position. You are a small target.
- Disadvantages – There is restricted movement for tracking and limited visibility.

4.6.5 Prone Position

To assume the prone position (*Figure 12-26*), first lay the launcher on the ground, pointed toward the target. Then, lie on your stomach at an angle of not less than 90 degrees to the line of fire to keep your body clear of the backblast. Your body should be straight, and your right leg should be directly on a line running through your right hip and right shoulder. Move your left leg to the left as far as possible without discomfort. Keep both heels close to the



Figure 12-26 — Prone position.

Interaction Available

ground. Place the launcher on your right shoulder and place both elbows under the launcher. Hold your head steady with your right eye lined up with the sights. Tracking a moving target from the prone position is not recommended. The shooter's movement is limited.

WARNING

Legs and feet may become injured from the backblast if the direction of the launcher is changed. Keep your legs and feet out of the backblast/danger area.

- Advantages – This is a very stable firing position. You are a small target.
- Disadvantages – There is limited movement for tracking. There is limited elevation of the launcher and poor visibility.

4.7.0 Engaging the Target

1. To engage a stationary target – Place the center post at the center mass of the target. Targets moving directly toward or away from the shooter are the same as stationary targets (*Figure 12-27, view A*).
2. To engage a slow moving target – Place the center post on the front leading edge of the vehicle (less than 10 miles per hour). This includes oblique moving targets (*Figure 12-27, view B*).
3. To engage a fast moving target (more than 10 miles per hour) – When the target is moving to the left, place the right lead post at the center of the mass. When the target is moving to the right, place the left lead post at the center of the mass (*Figure 12-27, view C*).

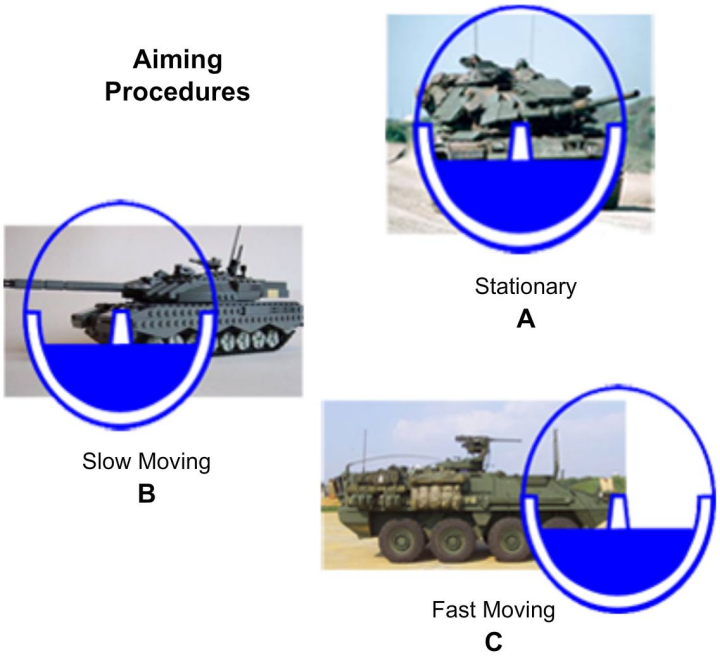


Figure 12-27 — Aiming the AT4.

4.8.0 Maintenance

The AT4 requires no preventive maintenance or repairs at the first or second echelon. No repair parts are supplied to the using organization.

4.9.0 Destruction

When capture of the AT4 is imminent or if it becomes necessary to abandon the system in a combat zone, the unit commander may order its destruction. Priority is given to the destruction of those parts most difficult to replace, such as the sight, firing mechanism, and launching tube. The same parts of the system should be destroyed to prevent the enemy from reconstructing one complete unit from several damaged ones. In combat, after the launcher has been fired, it should be destroyed to prevent the enemy from converting the launcher into a booby trap.

Destruction can be accomplished by four methods:

1. Burning
2. Demolition
3. Gunfire
4. Crushing

4.10.0 Ammunition

The AT4 is issued as a round of ammunition. The cartridge consists of a fin assembly with tracer element; point-initiating, piezoelectric fuse; warhead body with liner; and a precision-shaped explosive charge (it is the only tactical ammunition for the AT4) (*Figure 12-28*). The AT4 is used mainly as an antiarmor weapon; however, it can be used against gun emplacements and bunkers.

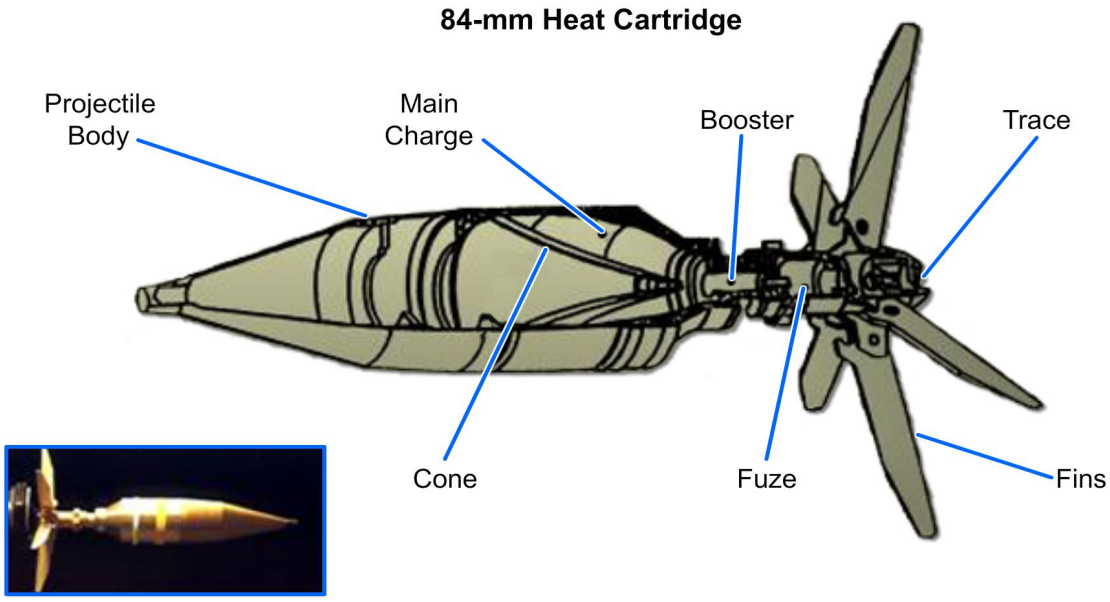


Figure 12-28 — AT4 ammunition.

4.10.1 Tactical Cartridge

Length: 460 mm (18 inches)

Caliber: 84mm

Warhead: HEAT (precision-shaped charge)

Fuze: Piezoelectric crystal

4.11.0 General Safety Precautions

The following precautions are necessary to prevent injury to personnel and damage to material:

1. Take care in selecting positions for firing. Avoid areas that could cause you to fire through a screen of brush or trees. Impact with a twig or branch may deflect the rocket or cause it to detonate. You must try to obtain concealment, but not at the risk of safety.
2. To prevent the rocket from striking the foreground and causing serious injury to personnel, maintain the launcher in the firing position until the rocket has left the launcher.
3. Avoid the blast of flame and ejected residue to the rear of the launcher. Remove flammable material, such as dry vegetation, from the backblast area (*Figure 12-29*). Keep personnel and ammunition clear of the rear danger area unless adequate shelter protection is provided. Sand or loose dirt in the backblast area can also reveal your position to the enemy.
4. Do NOT fire rockets at temperatures below –40°F or above 140°F.
5. Never fire a damaged weapon.

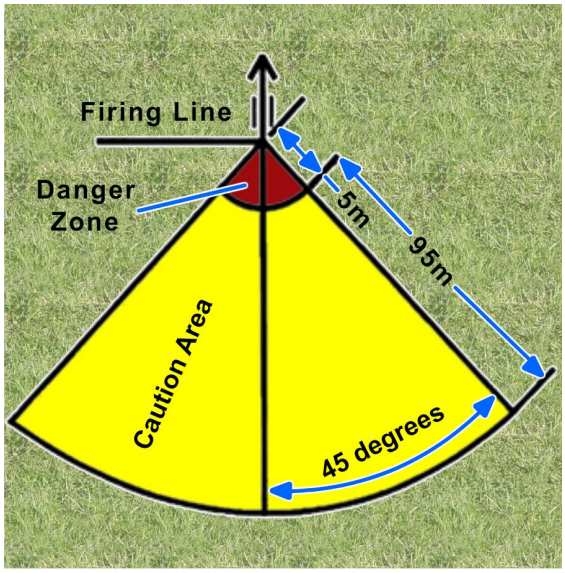


Figure 12-29 — Danger zone.

Summary

In this chapter, you were introduced to several weapons a Seabee might be called upon to use. Proper operation, cleaning, and use of these weapons are the key to your survival in a combat situation. This manual is by no means the end-all for weapons training. You must complete the proper courses to be qualified to operate these weapons. This Non-Resident Training Course (NRTC) is designed to make you familiar with some of the different weapons available. We have discussed the M240B, M2, M19 and the AT-4. By now, you should be able to identify these weapons and their systems so you will be able to qualify easier and recall informationin the future.

Assignment 12

Objectives

1. Recognize the characteristics and data of an M240B machine gun.
2. Specify operating principles of an M240B machine gun, actions taken to correct malfunctions or stoppages, and clearing procedures.
3. Describe the types and uses of M240B machine gun ammunition.
4. Identify principles and techniques of M240B machine gun marksmanship, including obtaining an accurate initial burst of fire, adjusting the fire, manipulating the controls, and developing speed.
5. List characteristics, components, and parts of the M2 .50 caliber heavy machine gun.
6. List characteristics, components, and parts in the disassembly, assembly, and maintenance of the MK19 MOD 3 40mm machine gun.
7. Describe the launcher and cartridge, 84mm M136 (AT4) HEAT lightweight, anti-armor weapon system relative to purpose, use, operation, range, weight and components.

Questions

1. What is the ammunition capacity of an M240B is a linked belt fed machine gun?

    1. 100
    2. 200
    3. 300
    4. 400

2. What is the cyclic rate of fire for the M240B in rounds per minute?

    1. 500-1000
    2. 550-1050
    3. 600-1000
    4. 650-1050

3. On an M240B machine gun, after the round is pushed into the chamber, what step occurs next?

    1. Chambering
    2. Firing
    3. Locking
    4. Cocking

4. A runaway machine gun can be stopped by which of the following methods?

    1. Raising the feed cover
    2. Twisting or breaking the ammunition belt
    3. Pulling the cocking handle to the rear
    4. placing the weapon on safe

5. What number of rounds fired within a 2-minute period can cause a cookoff in an M240B machine gun?

    1. 100
    2. 150
    3. 200
    4. 250

6. What is the approximate weight (empty) of the M240 machine gun in pounds?

    1. 27
    2. 34
    3. 53
    4. 84

7. What is the maximum range, in feet, of the M240 machine gun?

    1. 2,625
    2. 6,000
    3. 12,221
    4. 22,200

8. What caliber is the M240 machine gun?

    1. .50
    2. 7.62
    3. 40
    4. 44

9. What is the best description of a M2 .50 caliber heavy machine gun?

    1. A recoil-operated, air-cooled, magazine-fed machine gun capable of semiautomatic and automatic fire
    2. A recoil-operated, air-cooled, belt-fed machine gun capable of semiautomatic and automatic fire
    3. A gas-operated, air-cooled, belt-fed machine gun capable of automatic fire only
    4. A gas-operated, water-cooled, belt-fed machine gun capable of semiautomatic and automatic fire

10. What is the (a) respective maximum effective range (b) muzzle velocity in (feet per second) (M2 ball), and (c) cyclic rate (rounds per minute) of fire of an M2 .50 caliber heavy machine gun?

    1. 1829 m, (b) 3050, (c) 450-600
    2. 1829 m, (b) 2500, (c) 350- 500
    3. 7 00 yd, (b) 2500, (c) 450- 600
    4. 7400 yd, (b) 3050, (c) 350-500

11. What is the approximate weight (empty), in pounds, of the M2 .50 caliber machine gun?

    1. 27
    2. 34
    3. 53
    4. 84

12. What is the maximum range, in feet, of the M2 .50 caliber machine gun?

    1. 6,000
    2. 11,000
    3. 12,221
    4. 22,200

13. After screwing the barrel in all the way on a M2 .50 caliber heavy machine gun, you should back it off how many notches?

    1. One
    2. Two
    3. Three
    4. Four

14. What action is taken in order to fire a M2 .50 caliber heavy machine gun in semi-automatic mode?

    1. depress the bolt latch release and engage the bolt latch release lock
    2. depress the trigger
    3. depress the bolt latch release and depress the trigger
    4. slide the bolt to the rear and engage the bolt latch release lock

15. Assume that a belt of ammunition has been inserted into a M2 .50 caliber heavy machine gun, the first round is engaged by the belt holding pawl, and the bolt latch release is locked. What action is necessary to load the gun fully?

    1. Pull the retracting slide handle all the way to the rear and release
    2. Pull the retracting slide handle all the way to the rear, depress the trigger, and pull the slide handle to the rear a second time
    3. Pull the retracting slide handle to the rear and move it forward, release the bolt, pull the retracting slide handle to the rear a second time and move it forward, and release the bolt again
    4. Pull the retracting slide handle all the way to the rear and release it twice

16. On an M2 .50 caliber heavy machine gun, headspace is the distance measured between what two parts?

    1. Rear of the firing chamber and origin of the rifling
    2. Rear of the barrel and face of the bolt
    3. Base of a chambered cartridge and face of the bolt
    4. Face of the bolt and barrel extension

17. When the GO end of the headspace gauge cannot inserted into the chamber, what is the problem and what corrective action should you take?

    1. Excessive headspace; unscrew the barrel one notch at a time
    2. Excessive headspace; screw in the barrel one notch at a time
    3. Insufficient headspace; unscrew the barrel one notch at a time
    4. Insufficient headspace; screw in the barrel one notch at a time

18. Timing of a M2 .50 caliber heavy machine gun is important for which of the following reasons?

    1. Timing ensures the gun is operating properly
    2. When the timing is not set correctly, a round cannot be chambered
    3. Timing prevents contact between the front end of the barrel extension and the trunnion block
    4. With the gun out of timing, it does not operate as fast as it should

19. What is the (a) length, in inches, (b) overall weight, in pounds, and (c) the maximum range, in meters, of the AT4?

    1. 30, (b) 13.4, (c) 2100
    2. 36, (b) 18.2, (c) 1975
    3. 40, (b) 14.8, (c) 2100
    4. 40, (b) 14.3, (c) 2150

20. What is the total weight, in pounds, of an AT4 cartridge?

    1. 9
    2. 7
    3. 5
    4. 4

21. The forward safety of an AT4 is located on what part of the firing mechanism?

    1. Next to the transport safety pin
    2. Below the cocking lever
    3. To the right of the front sight
    4. On the forward end of the firing mechanism

22. You are preparing to fire the AT4. Which of the following steps is out of sequence?

    1. Place the launcher on your shoulder
    2. Release the sights
    3. Cock the launcher
    4. Remove the transport safety pin

23. What action should you take first if the AT4 fails to fire?

    1. Release the forward safety
    2. Dispose of the faulty launcher
    3. Remove the launcher from your shoulder
    4. Wait 2 minutes and try again

24. In combat, after the AT4 is fired, it should be destroyed to prevent enemy use. The methods of destruction are burning, demolition, and what other actions?

    1. Submergence in water and removal of sights
    2. Gunfire and crushing
    3. Removal of sights and the safety pin
    4. Gunfire and removal of sights

25. When sighting an AT4, the gunner must first take what step?

    1. Place the 200-meter range on the target center of mass
    2. Apply the lead cross rule
    3. Estimate the distance to the target
    4. Estimate the speed of the target

26. **(True or False)** The AT4 can be fired from either the right or left shoulder.

    1. True
    2. False

27. What shooting position is most suitable for engaging moving targets with the AT4?

    1. Standing only
    2. Kneeling only
    3. Both standing and kneeling
    4. Prone

28. To limit the possibility of malfunctions with the AT4, you should **NOT** use the weapon outside of what temperature range in degrees Fahrenheit?

    1. -40 to 140
    2. -50 to 130
    3. -60 to 120
    4. -70 to 110

ASSIGNMENT 12

Crew Served Weapons and AT4

Directions: Select the correct answer from the list of alternates below each question in the end of chapter assignment. Write in the answer next to the corresponding question number below. Use this answer sheet as a reference to completing the online assignment related to this assignment.

1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

11.	
12.	
13.	
14.	
15.	
16.	
17.	
18.	
19.	
20.	

21.	
22.	
23.	
24.	
25.	
26.	
27.	
28.	

Additional Resources and References

This chapter is intended to present thorough resources for task training. The following reference works are suggested for further study. This is optional material for continued education rather than for task training.

Navy Tactical Reference Publication, Force Protection Weapons Handling Standard Procedures and Guidelines, NTRP 3-07.2.2, Edition AUG 2003, Department of the Navy.

Machine Guns and Machine Gun Gunnery, U.S. Marine Corps, MCWP 3-15.1, PCN 143 000014 00, 1 September 1996.

Army TM 9-1005-3112-23&P, Technical Manual Unit and Direct Support Maintenance Manual Including Depot Maintenance Repair Parts for Machine Gun, 7.62 MM, M240B, (1005-01-412-3129), 21 June 1988.

Army TM 9-1010-230-10, Technical Manual and Operator's Manual for Machine Gun, 40MM, MK19, MOD3 (1010-01-126-9063), May 2001.

Trainee Feedback

Center for Seabees and Facilities Engineering (CSFE) makes every effort to keep their courses up-to-date and free of technical errors. If you have a suggestion, found an error or inaccuracy, please write, FAX or email us by using the form below. Use one form for each comment and be sure to fill in the information as accurately and detailed as possible. Thank you for your assistance.

Write: CSFE
NCF Training Division (N7B)
3502 Goodspeed St.
Port Hueneme, CA 93043-4337

FAX: (805) 982-5508 / DSN 551-5508

E-mail: CSFE_CBCH@navy.mil

Trainee Feedback Form

Course: Seabee Combat Handbook, Volume ____, NAVEDTRA: _____

Course Date: _____ Chapter Number: _____ Page: _____

Paragraph: _____ Sentence: _____ Figure: _____ Frame/View: _____

Description: _____
_____
_____
_____
_____
_____

(optional) Corrective action: _____
_____
_____

(optional) Supporting reference(s): _____
_____

Your email address, if a response is requested: _____

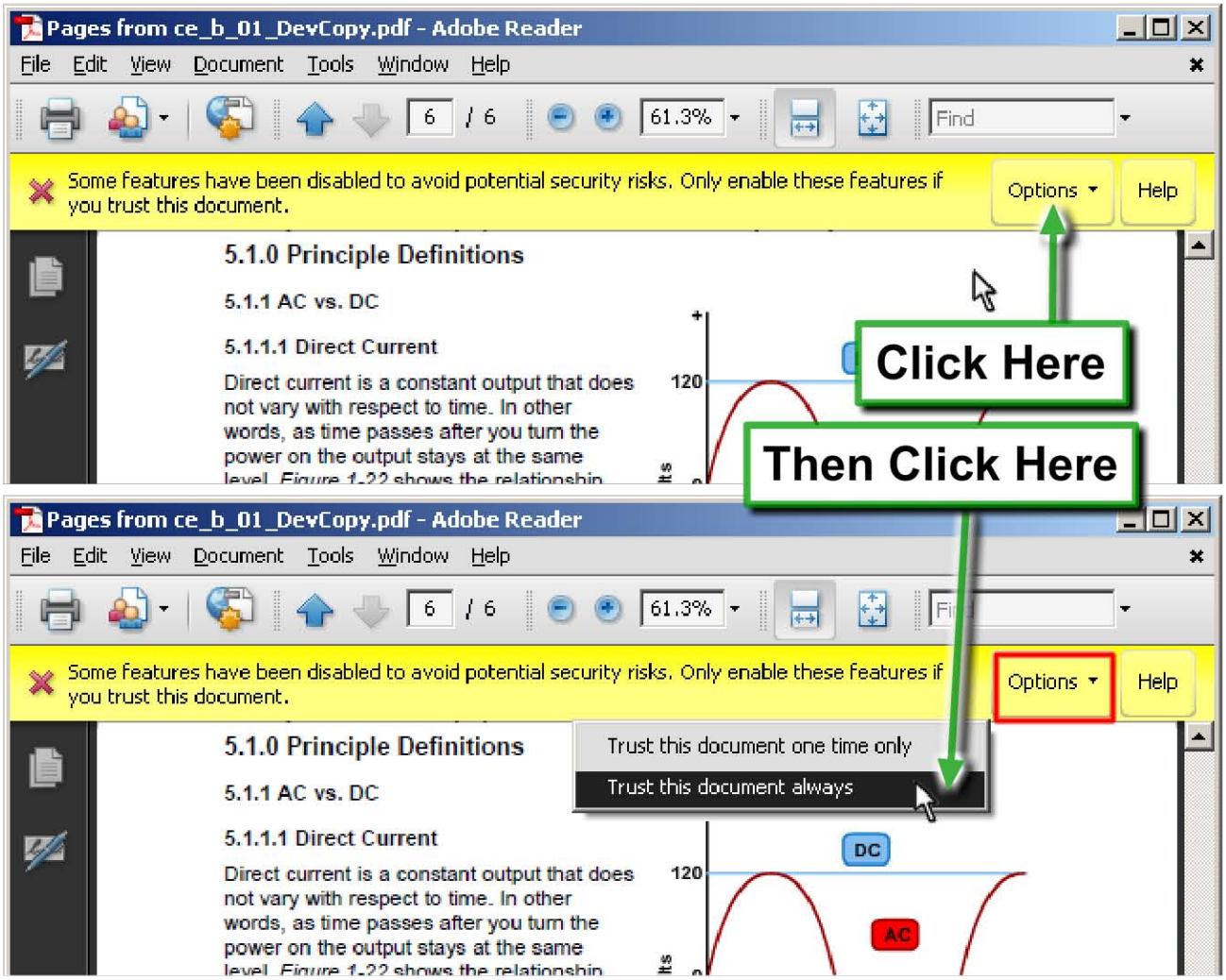
The Interactive features of this manual are currently disabled.

Many graphics will not appear correctly unless these features are turned on. You should either see a popup window, or a yellow banner at the top of the application. To enable the Interactive features of this manual follow the steps illustrated below:

If you see a popup window do the following:



If you see a yellow banner, do the following:



Once you have completed either of the above procedures the features will be enabled for this document, and this warning won't appear again after you leave this page.

Chapter 13

Marksmanship and Techniques of Fire

Topics

1.0.0 Rifle Marksmanship

2.0.0 Pistol Marksmanship

3.0.0 Machine Gun Techniques of Fire

To hear audio, click on the icon: 

Overview

Once you have been introduced to the different weapons the Seabee might be asked to use, it is equally important to know how to use them effectively. There is no sense in having a crew-served weapon if you don't know how to shoot it properly, or your new responsibilities. This chapter will cover the functioning, mechanical training, ammunition, safety precautions, and marksmanship techniques for the weapons a Seabee might be required to use in defense.

Objectives

When you have completed this chapter, you will be able to do the following:

1. Identify principles and techniques of rifle marksmanship, including sighting and aiming, shooting positions, trigger control, and estimating wind speed.
2. Identify principles and techniques of pistol marksmanship, including sighting and aiming, shooting positions, and trigger control.
3. Identify the fire characteristics of machine guns, and denote the different classes of fire with respect to the target, the ground, and the gun.
4. Specify the principles of machine gun fire discipline, control, and distribution.

Prerequisites

There are no prerequisites for completing this manual.

Features of this Manual

This manual has several features which make it easy to use online.

- Figure and table numbers are italicized within the handbook text. Figure and table reference numbers are conveniently located next to (or near) the applicable handbook text.
- Audio and video clips are included in the text, with italicized instructions telling you where to click to activate the appropriate link.
- Review questions are included at the end of this chapter as the chapter assignment. To submit assignments log into https://www.courses.netc.navy.mil, go to "Student Services", in the drop down click on "Active Courses", go to

"View/Submit Answers" next to the course you wish to submit answers for. Assignments may be submitted to the above Web site as they are completed, and instant scoring is available. Your completion letter is available as soon as you pass all assignments.

- A form at the end of each chapter allows your input for improving the manual or correcting errors to be brought to the attention of CSFE's Technical Review Committee. Your input is important and will help keep this manual up to date and free of technical errors.

1.0.0 RIFLE MARKSMANSHIP

To be an integral part of an effective, combat-ready defensive force, Seabees must be skilled in the techniques and procedures of rifle marksmanship. Well trained and confident riflemen can deliver accurate fire against the enemy to protect themselves and their fellow Seabees.

Good shooting, whether on the firing range or in combat, depends upon the application of basic marksmanship principles: aiming, breathing, and trigger control. These principles are interrelated and must be practiced each time you fire a shot so you achieve effective results.

1.1.0 Aiming

Aiming is a fundamental aspect of rifle marksmanship—if the rifleman's aim is off, effective fire cannot be delivered and spent rounds are wasted. Proper aiming is achieved by obtaining proper sight alignment and a correct sight picture.

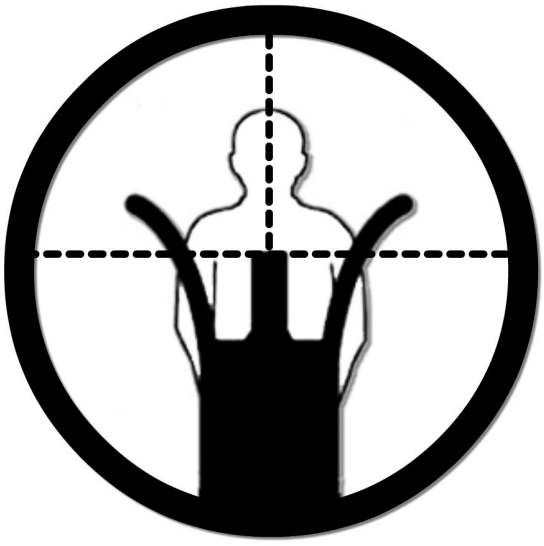


Figure 13-1 — Correct sight alignment and picture.

1.1.1 Sight Alignment

Sight alignment is the art of looking through the rear sight aperture, focusing the eye on the front sight post, sometimes referred to as a blade, and centering the front sight post exactly in the rear sight aperture both vertically and horizontally. The body of the front sight post is centered vertically. The tip of the front sight post is centered horizontally within the rear sight aperture (*Figure 13-1*).

An error in sight alignment results in a misplaced shot. When sight alignment is off, the alignment of the gun's barrel is offset—vertically, horizontally, or both—from an imaginary line between shooter and the intended target. This offset results in the bullet straying farther from the target as the distance between shooter and target increases (*Figure 13-2*).

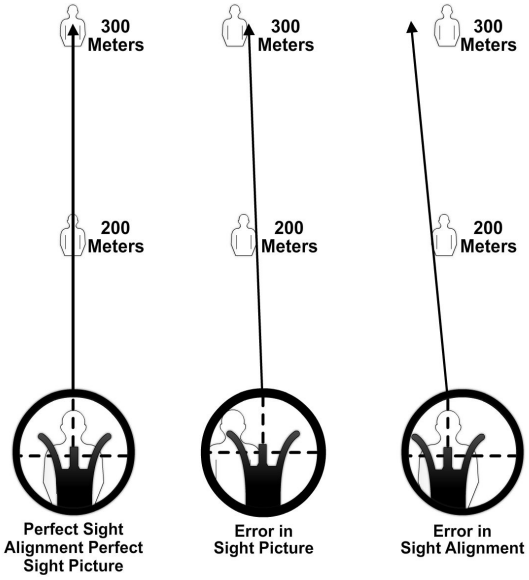


Figure 13-2 — Target offsets.

1.1.2 Sight Picture

A correct sight picture is achieved by placing the tip of the front sight post on the center of the target while maintaining a proper sight alignment (*Figure 13-1*).

As with improper sight alignment, an improper sight picture will also result in a misplaced shot. However, unlike improper alignment, if the sight picture is offset, the

path of the bullet will maintain that same offset throughout the bullet's travel regardless of the distance between the shooter and target (*Figure 13-2*).

1.1.3 Stock Weld

Stock weld is the point of firm contact between the cheek and the stock of the rifle (*Figure 13-3*). The head should be as erect as possible to enable the aiming eye to look straight through the rear sight aperture. Once a comfortable cheek position is found, you should position the rifle in the same stock weld position every time the rifle is aimed. Moving the cheek up and down the rifle stock results in a different perspective at the rear aperture and a different shot placement for a given sight picture and alignment.



Figure 13-3 — Stock weld.

1.1.4 Eye Relief

Eye relief is the distance between the rear sight aperture and the aiming eye. Eye relief normally ranges between two and six inches depending on the individual and shooting position. If eye relief is too short, the rear aperture will be too large in relation to the front post. If eye relief is too long, the inverse is true. In either case it will be difficult to obtain proper sight alignment and a correct sight picture. While eye relief varies slightly from one position to another, it is important to have the same eye relief for all shots fired from a particular position.

1.2.0 Breath Control

Proper breath control is critical to the aiming process. Breathing causes the body to move, which transfers to the rifle and ultimately disrupts the sight picture. Breath control allows you to fire the rifle at the moment of least movement. The following steps comprise the basic technique to control your breathing while firing a rifle.

1. Breathe naturally until the sight picture begins to settle.
2. Take a slightly deeper breath.
3. Exhale and stop at the natural respiratory pause following exhalation.
4. Fire the shot during the pause in breathing.

NOTE

If the sight picture does not sufficiently settle to allow the shot to be fired, resume normal breathing and repeat the process.

During a combat situation, you may not be able to fire a shot during the natural respiratory pause. It may be necessary to take several deep breaths before holding the breath. The basic technique is as follows:

1. Take a deep breath to fill the lungs.

NOTE

It may be necessary to take several deep breaths quickly before holding the breath.

2. Hold the breath and apply pressure to the trigger.
3. Fire the shots.

1.3.0 Trigger Control

Trigger control is the skillful manipulation of the trigger that causes the rifle to fire without disturbing sight alignment or sight picture. Controlling the trigger is a mental process, while pulling the trigger is a physical process.

1.3.1 Grip

A firm grip forms the basis of effective trigger control (*Figure 13-4*). The grip is established prior to placing the finger on the trigger. To form a solid grip, position the "V" formed between the thumb and index finger on the grip behind the trigger. Wrap the fingers and thumb around the grip so the trigger finger rests naturally on the trigger and the thumb can operate the safety. The trigger finger should not contact the rifle receiver or trigger guard. A firm grip should be maintained to allow pulling the trigger straight back without disturbing the sight picture.



Figure 13-4 — Proper trigger grip.

1.3.2 Uninterrupted Trigger Control

Uninterrupted trigger control is the preferred method in a combat situation. After obtaining a correct sight picture, the shooter applies smooth, continuous pressure rearward on the trigger until the shot is fired.

1.3.3 Interrupted Trigger Control

Interrupted trigger control is used at any time the sight alignment is interrupted or the target is temporarily obscured. In any situation where the sight picture is lost, perform the following steps for interrupted trigger control:

1. Apply rearward pressure on the trigger until the sight picture is lost.
2. Stop the rearward motion, but maintain pressure on the trigger, until the sight picture is reacquired.
3. Continue the rearward motion on the trigger until the shot is fired.

1.4.0 Shooting Positions

Prior to firing a rifle, you must decide how you want your body situated. There are four basic shooting positions: prone, sitting, kneeling, and standing. When deciding which position to assume, you must look at how each provides stability, permits mobility, and offers observation of the target for the given terrain, available cover, and any other factors peculiar to the shooting environment.

1.4.1 Prone Position

The prone position (*Figure 13-5*) provides a very steady foundation for shooting and presents a low profile for maximum concealment. However, the prone position is the least mobile of the shooting positions and it may be difficult to observe your target.



Figure 13-5 — Rifle prone position.

1.4.2 Sitting Position

The sitting position provides a stable base from which to fire but it limits lateral movement and maneuverability. This position provides greater elevation than the prone position for greater visibility while still having a fairly low profile. There are three variations of the sitting position: crossed ankle, crossed leg, and open leg. The open leg variation is especially well suited for downward sloping terrain.

1.4.3 Kneeling Position

The kneeling position (*Figure 13-6*) is quick to assume and offers greater maneuverability and a better field of view than either the prone or sitting positions. It is often assumed after firing from the standing position.

1.4.4 Standing Position

The standing position (*Figure 13-7*) is the quickest position to assume and offers the easiest maneuverability. It allows the greatest mobility of all the shooting positions. This position is often used for immediate engagement of the target.



Figure 13-6 — Kneeling position.



Figure 13-7 — Standing position.

1.5.0 Effects of Wind on the Bullet

Up to this point, aiming and firing were presented without regard to the external forces that can divert a bullet from its intended path. Although gravity, temperature, and precipitation all affect the travel of the bullet, wind presents the greatest problem to shooting.

1.5.1 Physical Effects

The physical effect of wind on the bullet is that it literally blows the bullet off course (*Figure 13-8*). The greater the wind speed, or velocity, the more the bullet will be deflected. Also, the farther a bullet has to travel, the more it is deflected. A wind that will have little or no effect on a bullet at 150 meters will have some effect on one at 300 meters. The effect of the wind on the bullet in flight is compensated for by applying proper windage adjustment to the sights.

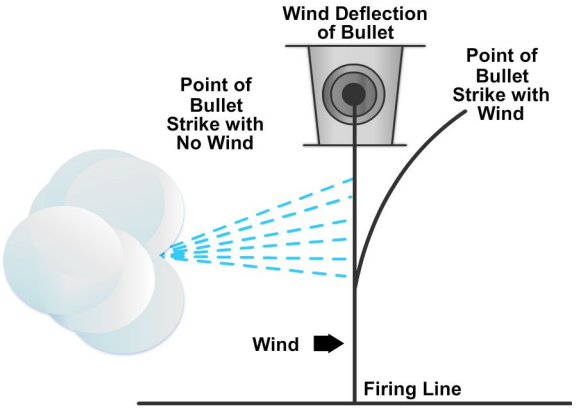


Figure 13-8 — Wind effects.

1.5.2 Windage Adjustments

Adjustments are made to the rear sight aperture of the rifle by turning the windage knob a certain number of clicks. The number of clicks is determined by taking into consideration the wind direction, wind classification, and wind velocity; then referring to a windage click chart for the flag method (*Table 13-1*).

Table 13-1 — Windage Click Chart for the Flag Method

RANGE METERS	5 MPH		10 MPH		15 MPH		20 MPH		25 MPH	
	WIND VALUE		WIND VALUE		WIND VALUE		WIND VALUE		WIND VALUE	
	FULL	HALF	FULL	HALF	FULL	HALF	FULL	HALF	FULL	HALF
180	2	1	3	1	5	2	6	3	8	4
275	3	1	6	3	10	5	13	6	16	8
365	4	2	9	4	13	6	18	9	22	11
460	6	3	12	6	18	9	24	12	30	15

1.5.2.1 Wind Direction

The direction of wind is explained by reference to the face of a clock. The firing line is thought of as the center of a big clockface with 12 o'clock toward the target and 6 o'clock to the rear. For example, wind blowing from the right rear would be a 5 o'clock wind (*Figure 13-9*).

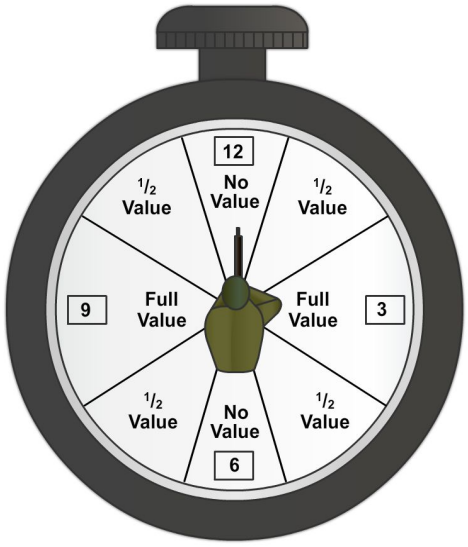


Figure 13-9 — Wind direction.

1.5.2.2 Wind Classification

Winds are classified according to the direction from which they are blowing in relation to the direction of fire. The target is always located at 12 o'clock. Using the clock system, wind direction is classified as follows:

- Zero value – 11 to 1 or 5 to 7 o'clock
- Full value – 2 to 4, or 8 to 10 o'clock
- 1/2 value – 1 to 2, 4 to 5, 7 to 8, or 10 to 11 o'clock

1.5.2.3 Wind Velocity

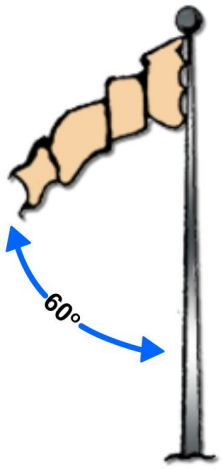
There are two methods used to determine wind velocity: observation and flag. The observation method is the one you'll use in a tactical situation. Wind velocity is estimated with the observation method using these guidelines:

- 0 – 3 miles per hour (mph) wind is hardly felt on the face and will cause smoke to drift lightly.
- 3 – 5 mph winds can be felt lightly on the face.
- 5 – 8 mph winds will keep tree leaves in constant motion.

- 8 – 12 mph winds raise dust and loose paper.
- 12 – 15 mph winds cause small trees to sway.
- 15 – 25 mph winds cause larger trees to sway.

The flag method is primarily used on the gun range. To estimate wind velocity with this method (*Figure 13-10*):

1. Estimate the angle created between the flagpole and the flag in degrees.
2. Divide the angle by four to estimate wind velocity in miles per hour.



Estimate angle (in degrees) formed by the flag and pole. Dividing this angle by the constant number 4 will give you the approximate wind velocity in miles per hour (MPH).

Example: The wind is blowing the flag out at an angle of 60°.

60/4 = 15 miles per hour

Figure 13-10 — Flag method.

1.5.2.4 Trajectory

The trajectory of a projectile is its curved path through the air and is influenced by several factors. The major factors influencing the trajectory are the velocity of the bullet, the gravity of the earth, the rotation of the bullet, and the resistance of the air. Once the bullet exits the muzzle, it travels along the extended path of the barrel until it begins to fall due to the resistance of the air and influence of gravity. In order to overcome these factors, it is necessary to elevate the bore, or in other words, aim above the intended target to compensate for the bullet's curved path (*Figure 13-11*). The farther the bullet travels, the greater the curvature of this path. The highest point on the trajectory is two-thirds of the range from the gun to the target.

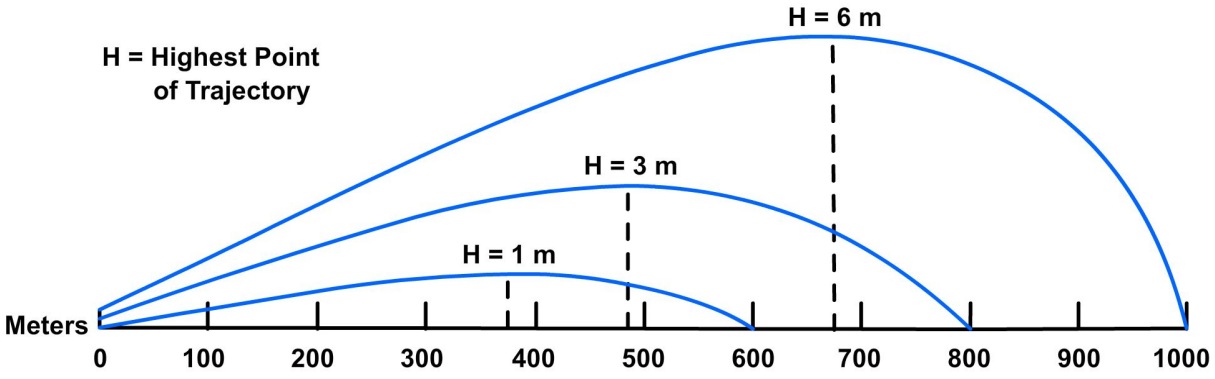


Figure 13-11 — Trajectory.

2.0.0 PISTOL MARKSMANSHIP

Good pistol shooting, like rifle shooting, depends upon the ability to master and apply certain basic marksmanship principles. You must practice these principles—aiming, breath control, and trigger control—to be an effective marksman.

2.1.0 Aiming

Maintaining the correct relationship between the pistol sights is essential for accurate target engagement. The sights on a pistol are much closer together than on a rifle. Because of this shorter distance between the sights, a small error in their alignment causes a considerable error at the target.

2.1.1 Sight Alignment

Sight alignment is best defined as placing the front and rear sights into correct alignment with the eye. For a correct sight alignment, the shooter must center the front sight in the rear sight, bringing the top of the front sight exactly level with the top of the rear sight. Correct sight alignment is essential for accuracy.

2.1.2 Sight Picture

A proper sight picture is achieved by placing the front sight where you intend the bullet to strike while maintaining sight alignment (*Figure 13-12*).



Figure 13-12 — Sight picture.

The pistol is usually fired without the benefit of any type of support for stability, causing the pistol to be in constant motion. Because the pistol is always moving, a sight picture is acquired within an aiming area instead of a specific point. The size of the aiming area is dependent on your own ability to stabilize the sights. As you become more proficient with the pistol, your aiming area will become more precise.

While aiming the pistol you must focus on the top edge of the front sight and fire the shot while maintaining the relationship between the front and rear sights within the aiming area. Focusing on the top edge of the front sight rather than the target keeps the front sight clear and distinct allowing you to detect minor variations in sight alignment.

2.2.0 Breath Control

Breathing causes movement of the chest, abdomen, and shoulders, which causes the pistol sights to move vertically while attempting to aim and fire. As in rifle marksmanship, the object of breath control is to stop breathing just long enough to fire the shot while maintaining sight alignment, stabilizing the sights, and establishing the sight picture.

2.3.0 Trigger Control

Trigger control allows you to fire a shot from the pistol while maintaining sight alignment and sight picture. With proper trigger finger placement and consistent muscular tension applied to the grip, the sights can be controlled as the trigger is moved to the rear.

2.3.1 Grip

A firm grip is essential for good trigger control. To establish a proper grip, place your hand around the pistol grip in a location that allows your trigger finger to lie naturally on the trigger. You must maintain firm and consistent pressure on the grip to allow

manipulation of the trigger without affecting sight alignment. If the sights move extensively while applying pressure to the trigger it is an indication of a weak grip, improper hand placement, and/or inconsistent muscular tension.

2.3.2 Trigger Finger Placement

After you have established a proper grip, place your finger on the trigger. Your finger should fall naturally so that moving the trigger to the rear does not disrupt alignment of the sights. Sideward pressure on the trigger will cause an error in sight alignment and a misplaced shot.

2.3.3 Uninterrupted Trigger Control

Uninterrupted trigger control consists of a steady, unchanging pressure on the trigger until the shot is fired. You will employ uninterrupted trigger control typically at close range, when the target area is large, and when stability is not critical for accuracy.

2.3.4 Interrupted Trigger Control

When the range to the target is long, the target area is small, and when stability is critical to maintaining the sight picture within your aiming area, you will employ interrupted trigger control. This method involves maintaining consistent rearward trigger movement unless alignment is disrupted or the sight picture moves outside the aiming area. If either situation occurs, stop trigger movement, make adjustments as necessary, and continue trigger movement until the shot is fired.

2.4.0 Standing Positions

The standing position is the most often employed position during a pistol engagement due to the short distance of the engagement and the nature of combat. When properly assumed, the standing position provides a stable base for firing, a clear field of view, and excellent mobility. The standing position can be adapted to either the WEAVER variation or the ISOSCELES variation.



Figure 13-13 — Weaver stance.

2.4.1 Weaver Standing Position

The key to successful employment of the Weaver variation (*Figure 13-13*) is the body's angle to the target and the push-pull pressure applied to the grip. Advantages of the Weaver stance include additional control and stability during firing as well as being easier to maintain a steady sight picture. The disadvantages of using the Weaver position are a greater recoil impact and increased time to recover the sights caused by the greater recoil.

To assume the Weaver standing position:

- Face the target and make a half turn to the right, keeping the pistol oriented toward the target. This orients the body at approximately a 40- to 60-degree angle oblique to the target. The shoulders are angled to the target, the left shoulder forward of the right. The feet are about shoulder-width apart, the left foot forward of the right.

- Grip the pistol grip firmly with the right hand. Place the right thumb on the safety.
- Keep the shoulders at a 40- to 60-degree angle oblique to the target and raise the right arm and extend it across the body toward the target. Ensure that the right shoulder does not roll forward or turn toward the target.
- Extend the left arm to the target, bending the left elbow to join the left and right hands. The left elbow is inverted and tucked in toward the body so the left arm supports the pistol.

NOTE

The angle of the body determines how much the elbow bends.

- Establish a two-handed firing grip in the Weaver variation (*Figure 13-14*).
- Place the palm of the left hand over the front of the right hand so the palm covers the curled fingers of the right hand. The trigger guard should rest in the "V" formed by the left thumb and forefinger. The knuckles of the left hand are just outboard of the trigger guard. A portion of the pistol grip is exposed.
- Rest the trigger finger naturally, straight and outside of the trigger guard, so the finger can be moved quickly and easily to the trigger.



Figure 13-14 — Weaver grip.

- Rest the left thumb against the receiver so that both thumbs are on the left side of the pistol. Once the safety is disengaged with the right thumb, the left thumb is placed over the right thumb and positive pressure is applied to hold the right thumb in place.
- Apply rearward pressure with the left hand and forward pressure with the right hand to achieve a "push-pull" grip. Isometric tension (push-pull) stabilizes the pistol during firing.
- Lean forward slightly and apply muscular tension throughout the body to stabilize the position and manage recoil. The muscular tension in the upper body is not symmetrical due to the "push-pull" tension applied on the grip.
- Keep the head erect so the aiming eye can look through the sights.

2.4.2 Isosceles Standing Position

The key to the Isosceles variation (*Figure 13-15*) is that the body is squared to the target and equal pressure is applied on the pistol from the grip. The Isosceles stance has less recoil than the Weaver stance allowing quicker recovery of the sights on target. However, stability of hold is degraded due to the pistol being further from the body without support, resulting in more difficulty in acquiring a sight picture.

To assume the Isosceles standing position:

- Face the target with feet approximately shoulder width apart. The shoulders are squared to the target.
- Establish a two-handed firing grip in the Isosceles variation (*Figure 13-16*).
- Grip the pistol grip firmly with the right hand. Place the right thumb on the safety.
- Place the heel of the left hand on the exposed portion of the pistol grip in the pocket formed by the fingertips and heel of the right hand. There should be maximum contact between the pistol grip and the hands. Wrap the fingers of the left hand over the fingers of the right hand. Ensure both thumbs rest on the left side of the pistol and point toward the target.
- Apply equal pressure on both sides of the pistol to allow for the best management of recoil.

NOTE

Ensure the left thumb does not apply excessive pressure to the slide stop or slide.



Figure 13-15 — Isosceles stance.

- Rest the trigger finger naturally, straight and outside of the trigger guard, so the finger can be moved quickly and easily to the trigger.

NOTE

The index finger of the left hand may or may not rest on the front of the trigger guard. Shooters with large hands must ensure that their right thumb does not rest on the slide stop, preventing reliable pistol operation.



Figure 13-16 — Isosceles grip.

- Elevate and extend the arms toward the target.
- Roll the shoulders forward and shift the body weight slightly forward to stabilize the position and better manage recoil. The left foot may be slightly forward of the right foot to balance the position. There should be an equal amount of muscular tension on both sides of the body to best manage recoil.
- Tuck the head between the shoulders; the head is extended forward but kept erect so the aiming eye can see through the sights.

3.0.0 MACHINE GUN TECHNIQUES OF FIRE

Before the machine gun can be employed to the best advantage, certain fundamentals must be understood and applied. The remainder of this chapter will focus on the essentials of machine gun fire and techniques used in machine gun gunnery.

3.1.0 Characteristics of Fire

To be an effective machine gun gunner you must understand the action and effect of the projectiles when fired. This section will introduce you to the following characteristics: burst of fire, cone of fire, beaten zone, dead space, and danger space.

3.1.1 Burst of Fire

The number of shots in a burst of fire is limited by several factors, including the size and shape of the target, ground formation, and ammunition supply. For normal ground targets, the number of rounds in each burst varies from about 6 to 20 for the heavy machine gun (.50 cal and MK19), and from 6 to 12 for the medium machine gun (M240B).

3.1.2 Cone of Fire

When several bullets are fired from a rifle or machine gun held in a fixed position, there is a slight variation in the trajectories. The causes of these differences are in the powder charge, the weight of the bullet, atmospheric and wind conditions, and vibration of the weapon. The resulting group of trajectories is known as the cone of fire (*Figure 13-17*).



Figure 13-17 — Cone of fire.

3.1.3 Beaten Zone

The beaten zone is the area on the ground upon which the cone of fire falls. The size and shape of the beaten zone depend upon the range and slope of the ground, as shown in *Figure 13-18*.

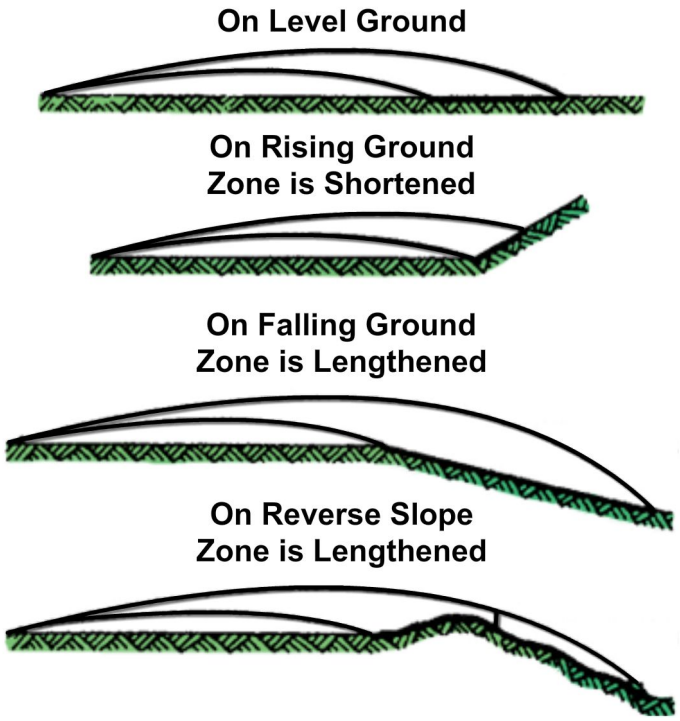


Figure 13-18 — Beaten zones.

3.1.4 Dead Space

Dead spaces (*Figure 13-19*) are areas within the maximum range of a weapon which cannot be covered by fire or observation. They are formed by obstacles, uneven terrain, pointing limitations of the weapon, and the characteristics of the trajectory. For example, an enemy crawling through a ditch, not exposed to the trajectory of the weapon's bullets, is in a dead space. One or more dead spaces in a defensive area not covered by other weapons provide opportunities for an enemy to penetrate friendly lines.

3.1.5 Danger Space

Danger space (*Figure 13-19*) is the area between the weapon and the point of impact in which the bullet does not rise above the average height of a potential enemy (presumed to be 1.8 meters). For example, at a range up to 850 meters, an M240B machine gun bullet fired over level or uniformly sloping ground does not rise above this height; therefore, for such ranges, the danger space is continuous. At ranges in excess of 850 meters, the trajectory is increased to accommodate the longer range, creating gaps in the danger space between the weapon and point of impact.

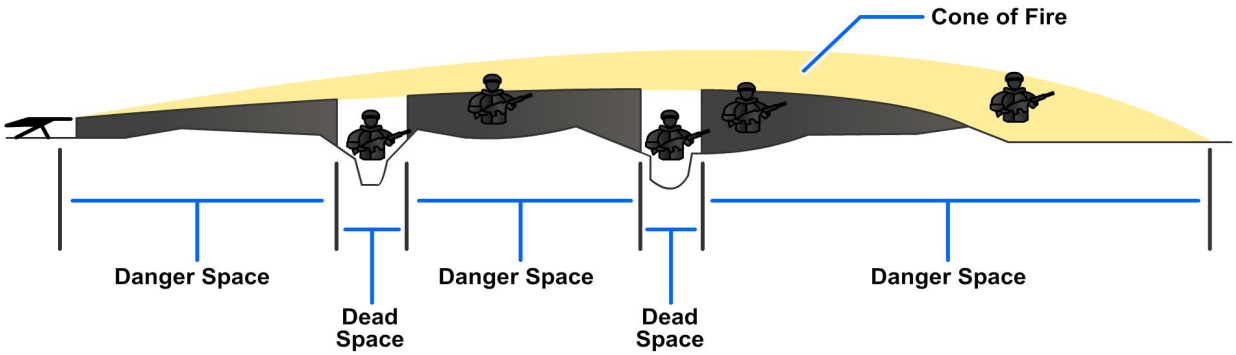


Figure 13-19 — Dead space and danger space.

3.2.0 Classes of Fire

Machine gun fire is classified with respect to the ground, the target, and the gun.

3.2.1 Classes of Fire with Respect to the Ground

Machine gun classes of fire with respect to the ground (*Figure 13-20*) are:

- GRAZING fire is approximately parallel to the ground where the center of the cone of fire does not rise above one meter. The maximum extent of grazing fire is dependent upon the weapon. For example, the M240B delivers grazing fire for approximately 580 meters. On level or uniformly sloping ground, danger space exists along the entire range of grazing fire.
- PLUNGING fire strikes the ground from above at a considerable angle. The danger space of plunging fire is practically limited to the beaten zone.

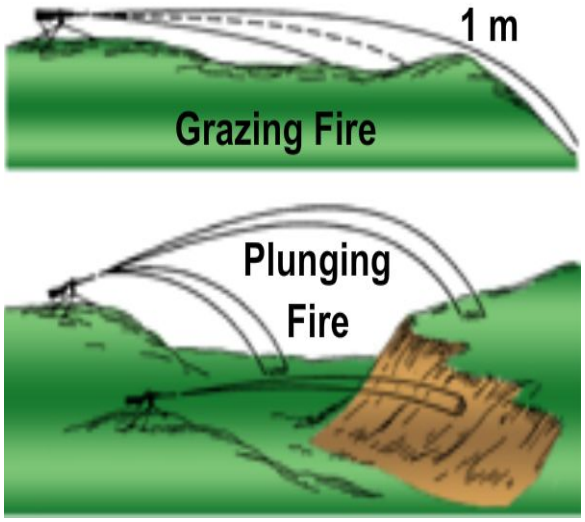


Figure 13-20 — Classes of fire with respect to the ground.

3.2.2 Classes of Fire with Respect to the Target

Machine gun classes of fire with respect to the target (*Figure 13-21*) are:

- FRONTAL fire is delivered with the long axis of the beaten zone perpendicular to the target.
- FLANKING fire is delivered against the flank of a target.

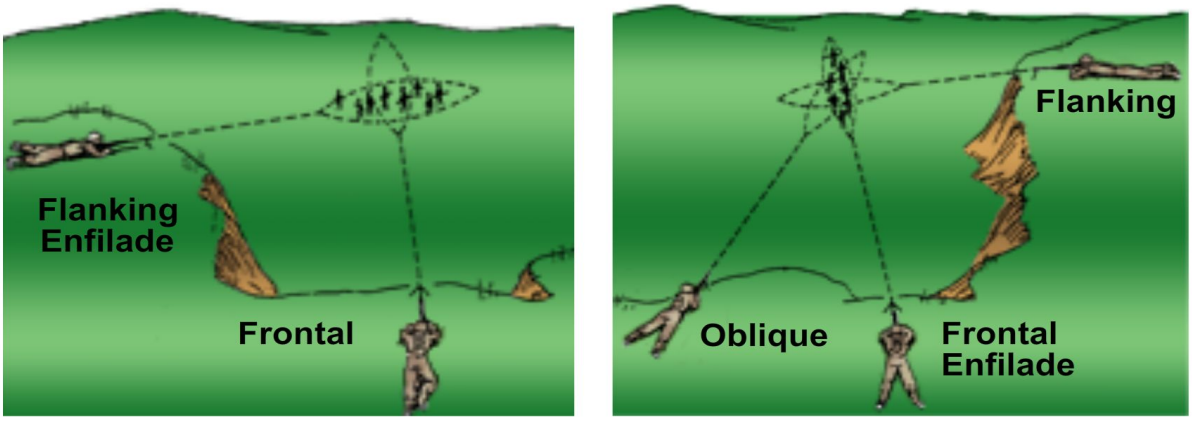


Figure 13-21 — Classes of fire with respect to the target.

- ENFILADE fire is delivered with the long axis of the beaten zone coinciding with or nearly coincides with the long axis of the target. Enfilade fire may be either

frontal or flanking. This class of fire is the most efficient with respect to the target as it makes maximum use of the beaten zone.

- OBLIQUE fire is delivered with the long axis of the beaten zone at an angle, but not completely perpendicular, to the beaten zone.

3.2.3 Classes of Fire with Respect to the Gun

Machine gun classes of fire with respect to the gun (*Figure 13-22*) are:

- FIXED fire is delivered on a point target. Little or no manipulation is required.
- TRAVERSING fire is distributed in width by successive changes in the horizontal direction of the gun. When delivering traversing fire, successive aiming points are selected throughout the target area.
- SEARCHING fire is distributed in depth by successive changes in the elevation of the gun. Searching fire is used against targets too deep to be included in the beaten zone of fixed fire.
- TRAVERSING AND SEARCHING fire is delivered both in width and depth by changes in horizontal direction and elevation. It is employed against a target whose long axis is oblique to the direction of the fire.

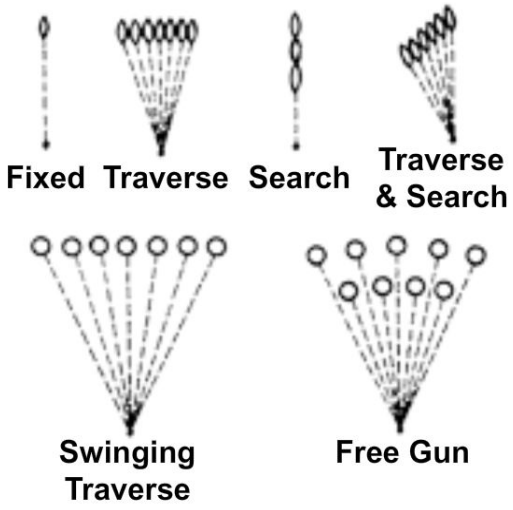


Figure 13-22 — Classes of fire with respect to the gun.

- SWINGING TRAVERSE fire is employed against targets which require major changes in direction but little or no change in elevation.
- FREE fire is delivered against moving targets which must be quickly engaged and which require rapid changes in both direction and elevation. Examples are aerial targets, vehicles, and mounted troops.

3.3.0 Overhead Fires

Overhead fire is fire delivered over the heads of friendly troops. A machine gun on a tripod is capable of delivering this type of fire because of the small and uniform dispersion of the cone of fire. In the attack, the use of overhead fire permits the machine gun to support the advance of rifle units.

NOTE

Overhead fire is not delivered when the gun is mounted on the bipod, unless the vertical interval of the troops below the gun target line is such as to make safety obvious.

The center of the cone of fire must clear the heads of the friendly troops by a prescribed distance (*Figure 13-23*). This distance, known as minimum clearance, is found by adding together the following elements:

- The average height of friendly troops (presumed to be 1.8 meters)
- Half the vertical dimension of the cone of fire at the range of the troops

- A margin of safety equal to the vertical distance which extends a 5-mil angle at the gun or 3 meters, whichever is greater

NOTE

A mil is a unit of angular measure equivalent to approximately .05625 degrees. Conversely, there are approximately 17.8 mils in one degree.

- An additional allowance to compensate for a 15-percent error in range determination

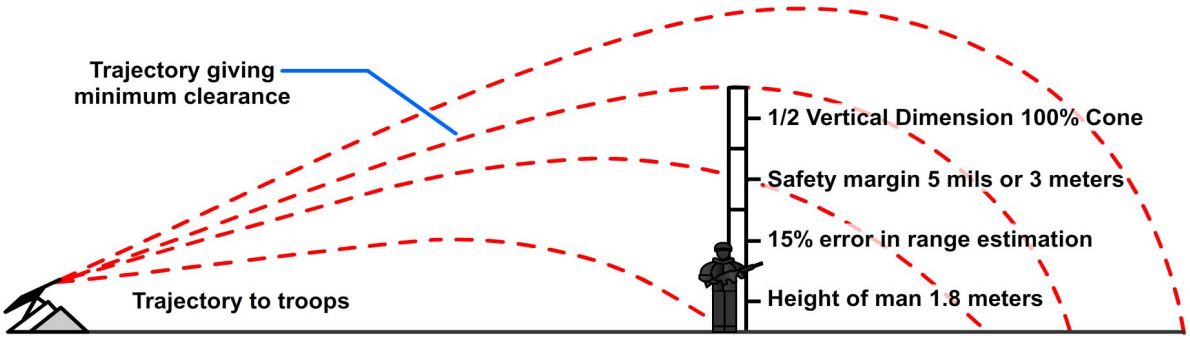


Figure 13-23 — Components of minimum clearance.

3.4.0 Fire Control

Fire control includes all operations connected with the preparation and actual application of fire to a target. Fire control implies the following abilities of the team leader:

- To have their unit open fire the instant they desire
- To adjust the fire of their weapons on the target
- To shift fire from one target to another
- To regulate the rate of fire
- To cease firing at will

A lack of proper fire control results in danger to friendly troops, loss of the surprise effect, premature disclosure of the position, misapplication of fire on unimportant targets, and waste of ammunition. Discipline and correct technical training are fundamental in ensuring fire control.

3.4.1 Chain of Fire Control

The platoon commander's orders to the team leaders assigns a mission for each gun team, which gives their firing position sector to occupy, the targets to engage, and the exact location of friendly troops that may be endangered by the fire in their sector. In addition, the platoon commander frequently prescribes the technique to use while engaging targets.

Team leaders are responsible for both the tactical and technical employment of their sector. It is their responsibility to pass on to the gun team information received from the platoon commander.

3.4.2 Fire Commands

Fire commands are the means by which fire control is exercised. Fire commands are the instructions issued to the gun crews that enable them to properly engage the desired targets. There are two types of fire commands—initial and subsequent. Initial fire commands are issued to engage targets and to shift fire to new targets. Subsequent fire commands are issued to adjust fire, change the rate of fire, and cease fire.

A good fire command is as brief as clarity will permit. It contains all necessary elements given in proper sequence. It is given clearly and at a rate that can be easily understood by the gunners. It is most improbable that a complete initial fire command would ever be issued during a fire fight. The team leader determines which elements of a fire command are necessary.

3.4.2.1 Initial Fire Commands

The following elements comprise the initial fire command and are represented by the acronym, **ADDRAC**:

- (**A**) ALERT is the first element of an initial fire command. The team leader announces **FIRE MISSION** to ready the gun crews to receive and execute the fire command.
- (**D**) DIRECTION is given only when the target is not obvious. Direction can be as simple as **RIGHT** or **FLANK**. The word **REFERENCE** is used when an object is used as a reference point. **TARGET** is used to clarify the target. Numbers are used for units of measure, often implied as meters or mils. An example direction command is: **REFERENCE: LONE TREE, RIGHT FIVE ZERO, TARGET: TROOPS EXTENDING RIGHT TWO FIVE**.
- (**D**) DESCRIPTION is a word or two used to inform the gunner of the nature of the target. Examples include: **TANK, MACHINE GUN,** and **TROOPS**.
- (**R**) RANGE follows the description of the target and is announced in meters. The words range and meters are not used. The range is announced in even digits, hundreds, or thousands.
- (**A**) ASSIGNMENT (or method) is utilized only when specific assignments are required to divide the target, assign class of fire, or to designate a rate of fire.
- (**C**) CONTROL designates when the action, such as firing, is to occur. It is often of great importance that machine gun fire be withheld for surprise and maximum effect. To ensure this, the team leader may preface the command with a modifier, such as, **AT MY COMMAND, FIRE**. Then at the time for firing the team leader will give the command **FIRE**.

3.5.0 Distribution of Fire

The distribution of fire, to be effective, must be over the entire target. Improper distribution results in gaps between zones and allows a part of the enemy to escape, to advance, or to use their weapons without effective opposition.

There is no fixed rule as to the maximum width of a target that may profitably be engaged by a single machine gun, although it is preferable that targets be 100 mils or

less in width in the case of a heavy gun on the tripod, and 50 mils or less in width in the case of the medium gun. Wider targets require appreciable time to traverse; a continuous volume of fire is not placed over the entire target; and the amount of ammunition required for a wider target is excessive for a single gun.

3.6.0 Final Protective Lines

An effective FPL is a predetermined line where bands of flanking, interlocking, and grazing fire are placed in order to stop enemy assaults.

- Flanking fire should utilize terrain and obstacles to force enemy formations into positions where the fires of the FPL will be best used. For example, every attempt should be made to position guns toward the flank of the defense and align FPLs along the enemy side of tactical wire (*Figure 13-24*). When the attacking enemy encounters the wire and slows or stops to negotiate it, flanking, enfilade fire from machine guns effectively engages them.
- Interlocking fire adds to the effectiveness of the fire plan by eliminating gaps in the FPLs and maximizing the coverage by fire across as much of the frontage as possible. Additionally, it provides mutual support between adjacent units.
- Grazing fire is used to place a wall of bullets, in the form of the cone of fire, between an advancing enemy and friendly positions. This is done by sighting the weapon on the farthest range possible where the center of the cone of fire will remain approximately 1 meter above the ground. This ensures that the lower bound of the cone of fire is as close to the ground as possible to minimize the enemy's opportunity to move underneath it without being hit.

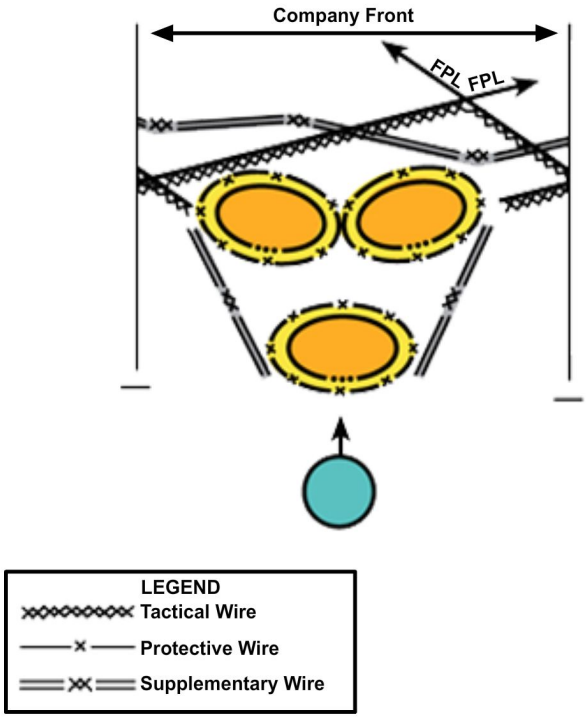


Figure 13-24 — Using obstacles to enhance FPL effectiveness.

Because of irregularities in the terrain, fixed machine gun fire cannot always produce the maximum effective grazing fire. Some searching fire may be used in conjunction with the fire of other weapons to ensure that all of the FPL is covered. Identification of gaps in the FPL—the dead space described earlier in this chapter—is critical. Dead space cannot be adequately engaged by the machine gun's fires and it requires the assignment of other weapons systems to cover the space.

Summary

In this chapter, you were introduced to the principles of rifle and pistol marksmanship, including proper sighting, breathing, and grip and trigger control. The characteristics and

techniques of machine gun fire, such as classes of fire and fire control, were covered in topic three. Proper employment of these weapons is the key to survival in a combat situation. As this manual only covered the basic fundamentals of gun employment, you must complete the proper courses to be qualified to operate these weapons and seek out additional training in order to be a proficient marksman or gunner.

Assignment 13

Objectives

1. Identify principles and techniques of rifle marksmanship, including sighting and aiming, shooting positions, trigger control, and estimating wind speed.
2. Identify principles and techniques of pistol marksmanship, including sighting and aiming, shooting positions, and trigger control.
3. Identify the fire characteristics of machine guns, and denote the different classes of fire with respect to the target, the ground, and the gun.
4. Specify the principles of machine gun fire discipline, control, and distribution.

Questions

1. What term describes the distance between the rear sight and the shooter's aiming eye?

    1. Aiming distance
    2. Peep distance
    3. Eye relief
    4. Peep relief

2. In rifle marksmanship, what term describes centering the front sight post in the rear sight aperture?

    1. Sight arrangement
    2. Sight picture
    3. Sight position
    4. Sight alignment

3. Regarding rifle marksmanship, which of the following statements describes the path of the bullet resulting from an improper sight picture?

    1. The path of the bullet will converge on the target.
    2. The path of the bullet cannot be predicted.
    3. The path of the bullet will maintain the same offset throughout the bullet's travel.
    4. The path of the bullet will stray further from the target.

4. What term is the point of firm contact between the cheek and rifle stock?

    1. Stock relief
    2. Stock weld
    3. Stock point
    4. Stock position

5. How many basic rifle shooting positions are there?

    1. 3
    2. 4
    3. 5
    4. 6

6. Which of the following breathing actions should be taken at the moment of pulling the trigger?

    1. Hold your breath
    2. Exhale
    3. Inhale
    4. Breathe normal

7. Which rifle firing position is often assumed after firing from the standing position?

    1. Sitting
    2. Prone
    3. Kneeling
    4. Crouch

8. Which factor presents the greatest problem to shooting?

    1. Precipitation
    2. Gravity
    3. Wind
    4. Temperature

9. When acquiring a sight picture in pistol shooting, what term is used to describe the location on the target?

    1. Aiming area
    2. Aiming location
    3. Focus point
    4. Focus area

10. When classifying wind using the clock system, what value is given to a 3 o'clock wind?

    1. One-half
    2. Full
    3. Zero
    4. One-third

11. What method of determining wind velocity is used in a tactical situation?

    1. Clock
    2. Flag
    3. Observation
    4. Angle

12. When firing a pistol, what type of trigger control is typically used at close range?

    1. Consistent
    2. Uninterrupted
    3. Inconsistent
    4. Interrupted

13. Which pistol standing variation provides additional stability and control during firing?

    1. Standard
    2. Weaver
    3. Isosceles
    4. Oblique

14. Which pistol shooting stance allows quicker recovery of the sights on target?

    1. Standard
    2. Weaver
    3. Isosceles
    4. Oblique

15. For normal ground targets, how many rounds are in each burst of fire from a medium machine gun?

    1. 1 to 5
    2. 6 to 12
    3. 13 to 15
    4. 16 to 20

16. What is the term for a projectile's curved path through the air?

    1. Trajectory
    2. Danger space
    3. Distribution of fire
    4. Cone of fire

17. What factor enables a machine gun on a tripod to deliver accurate overhead fire?

    1. The large, uniform dispersion of the cone of fire
    2. The small, uniform dispersion of the cone of fire
    3. The stability afforded by the tripod
    4. The elevation afforded by the tripod

18. Approximately how many mils are in one degree?

    1. 5.8
    2. 9.8
    3. 13.8
    4. 17.8

19. What is the first element of an initial fire command?

    1. Alert
    2. Advise
    3. Ready
    4. Prepare

20. What is the preferable maximum target width for a heavy machine gun?

    1. 50 mils
    2. 100 mils
    3. 150 mils
    4. 200 mils

21. What term is used to describe the area on the ground upon which the cone of fire falls?

    1. Impact zone
    2. Dead space
    3. Danger space
    4. Beaten zone

22. What classification of machine gun fire is approximately parallel to the ground where the center of the cone of fire does not rise above one meter?

    1. Grazing
    2. Traversing
    3. Fixed
    4. Overhead

23. What classification of machine gun fire is distributed in width by successive changes in the horizontal direction of the gun?

    1. Traversing
    2. Overhead
    3. Searching
    4. Grazing

24. What classification of machine gun fire is delivered with the long axis of the beaten zone coinciding with the long axis of the target?

    1. Frontal
    2. Flanking
    3. Oblique
    4. Enfilade

25. What is the term for areas within the maximum range of a weapon that cannot be covered by fire or observation?

    1. Hidden space
    2. Empty space
    3. Dead space
    4. Concealed space

ASSIGNMENT 13

Marksmanship and Techniques of Fire

Directions: Select the correct answer from the list of alternates below each question in the end of chapter assignment. Write in the answer next to the corresponding question number below. Use this answer sheet as a reference to completing the online assignment related to this assignment.

1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	

10.	
11.	
12.	
13.	
14.	
15.	
16.	
17.	
18.	

19.	
20.	
21.	
22.	
23.	
24.	
25.	

Additional Resources and References

This chapter is intended to present thorough resources for task training. The following reference works are suggested for further study. This is optional material for continued education rather than for task training.

Rifle Marksmanship, U.S. Marine Corps, MCRP 3-01A.

Pistol Marksmanship, U.S. Marine Corps, MCRP 3-01B.

Machine Guns and Machine Gun Gunnery, U.S. Marine Corps, MCWP 3-15.1.

Trainee Feedback

Center for Seabees and Facilities Engineering (CSFE) makes every effort to keep their courses up-to-date and free of technical errors. If you have a suggestion, found an error or inaccuracy, please write, FAX or email us by using the form below. Use one form for each comment and be sure to fill in the information as accurately and detailed as possible. Thank you for your assistance.

Write: CSFE
NCF Training Division (N7B)
3502 Goodspeed St.
Port Hueneme, CA 93043-4337

FAX: (805) 982-5508 / DSN 551-5508

E-mail: CSFE_CBCH@navy.mil

Trainee Feedback Form

Course: Seabee Combat Handbook, Volume ____, NAVEDTRA: _____

Course Date: _____ Chapter Number: _____ Page: _____

Paragraph: _____ Sentence: _____ Figure: _____ Frame/View: _____

Description: _____
_____
_____
_____
_____
_____

(optional) Corrective action: _____
_____
_____

(optional) Supporting reference(s): _____
_____

Your email address, if a response is requested: _____

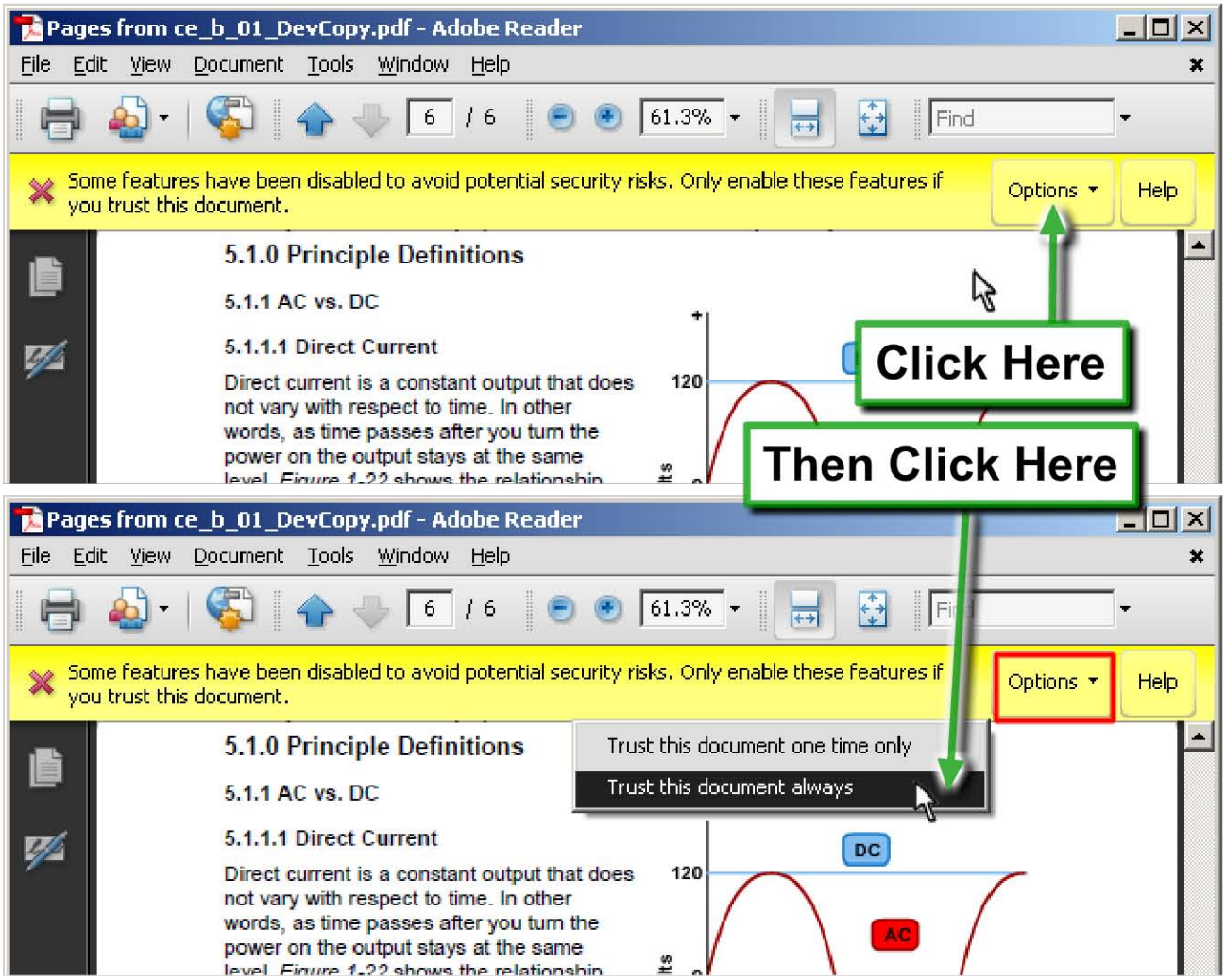
The Interactive features of this manual are currently disabled.

Many graphics will not appear correctly unless these features are turned on. You should either see a popup window, or a yellow banner at the top of the application. To enable the Interactive features of this manual follow the steps illustrated below:

If you see a popup window do the following:



If you see a yellow banner, do the following:



Once you have completed either of the above procedures the features will be enabled for this document, and this warning won't appear again after you leave this page.

Chapter 14

Hand Grenades, Land Mines, Pyrotechnics, and Improvised Explosive Devices

Topics

1.0.0 Hand Grenades

2.0.0 Land Mines

3.0.0 Pyrotechnics

4.0.0 Improvised Explosive Devices (IEDs)

To hear audio, click on the icon: 

Overview

The reasons Seabees fight and the methods they employ are different from those of other Sailors. The primary job of the Seabee is to build, but you cannot build unless you control the jobsite. Since the jobsite is often in a forward or unfriendly area, the need to conduct a proper defense becomes obvious. For this reason there are certain military requirements imposed on Seabees.

When required, your job is to use the defensive techniques and tactics you have been taught. The objective of this chapter is to make you familiar with the various types of grenades, land mines, flares, and Improvised Explosive Devices (IEDs) you might use or encounter in tactical situations. You will learn how to use these devices, their components and safety features, and effective countermeasure techniques against their use by the enemy.

Objectives

When you have completed this chapter, you will be able to:

1. Identify types of hand grenades and specify their components, principles of operation, uses, and procedures for throwing and handling them safely.
2. Specify the purpose of land mines and the methods of detonating and proper disposal.
3. Specify the uses, construction features, and range of the Claymore mine.
4. Recognize the construction features of and uses for trip flares and the methods of removing them.
5. Identify improvised explosive devices and describe methods of triggering, likely places of concealment, and common material makeup.
6. Specify the methods of detecting mines and Improvised Explosive Devices (IEDs) and personal protection measures.

Prerequisites

There are no prerequisites for completing this manual.

Features of this Manual

This manual has several features which make it easy to use online.

- Figure and table numbers are italicized within the handbook text. Figure and table reference numbers are conveniently located next to (or near) the applicable handbook text.
- Audio and video clips are included in the text, with italicized instructions telling you where to click to activate the appropriate link.
- Review questions are included at the end of this chapter as the chapter assignment. To submit assignments log into https://www.courses.netc.navy.mil, go to “Student Services”, in the drop down click on “Active Courses”, go to "View/Submit Answers" next to the course you wish to submit answers for. Assignments may be submitted to the above Web site as they are completed, and instant scoring is available. Your completion letter is available as soon as you pass all assignments.
- A form at the end of each chapter allows your input for improving the manual or correcting errors to be brought to the attention of CSFE’s Technical Review Committee. Your input is important and will help keep this manual up to date and free of technical errors.

1.0.0 HAND GRENADES

Hand grenades can be used to degrade the enemy's detection, observation, and engagement capabilities, enhancing the maneuver and firepower capabilities of ground forces conducting dismounted operations inside restrictive terrain. Hand grenades also provide the commander a non-lethal capability that contributes to increased protection.

1.1.0 General characteristics of hand grenades

The range of hand grenades, in relation to other weapons, is very short. This range depends entirely on the throwing ability of each individual. As a well-trained Seabee, you should be able to throw a grenade, such as the M67 fragmentation grenade, about 35 to 40 meters.

The effective casualty radius of a hand grenade is defined as the radius of a circular area around the point of detonation within which at least 50 percent of the exposed personnel become casualties. The radius is about 15 meters. This radius is small compared to the effective casualty radius of the other Seabee weapons. You must remember, however, that casualties can and do occur at distances much greater than the effective casualty radius.

Hand grenades do **NOT** detonate on impact. All casualty-producing grenades (fragmentation and white phosphorus) have a 4- to 5-second delay fuze. Chemical grenades have a 2-second delay fuze element.

You can compare a hand grenade to an ordinary firecracker. A firecracker consists of a paper body filled with gunpowder that is set off by a fuze. For example, when you light the fuze, it burns until it reaches the powder, which then explodes and shatters the paper body. A hand grenade functions in the same manner and consists of the same principal parts: filler, body, and fuze assembly (*Figure 14-1*).

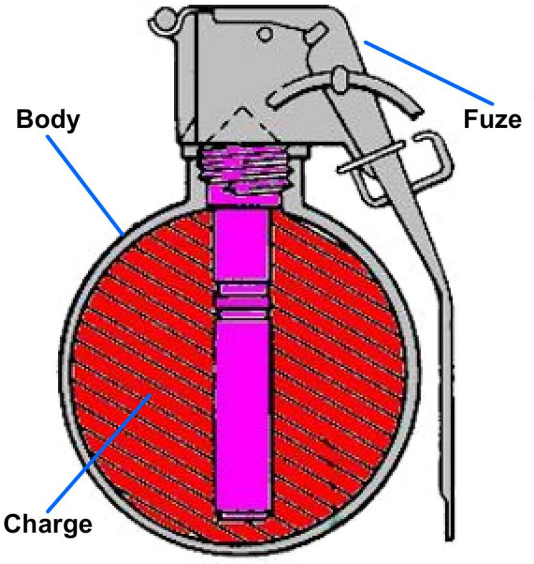


Figure 14-1 — The three parts of a grenade.

The body is the container that holds the filler. It may be made of metal, glass, cardboard, or other suitable material. It may be circular, cylindrical, or lemon-shaped. Regardless of their makeup and shape, all grenade bodies have two things in common: (1) they are hollow to contain filler and (2) they have an opening or threaded hole to receive the fuze.

Filler is placed in the grenade body. The filler may be an explosive, such as TNT, Composition B (a composite explosive more sensitive than TNT), or black powder. It may also be a chemical, such as tear gas, thermite (incendiary), or white phosphorus.

The fuze assembly is a mechanical and chemical device that causes the filler to detonate or burn. Fuzes that burn are used primarily with chemical grenades; fuzes that detonate are used to explode fillers, such as TNT and Composition B.

When you pull the safety pin from the grenade, the safety lever should be held down firmly by your grip. When you loosen or relieve this grip, the safety lever is forced free from the grenade by a spring, allowing the striker to hit the primer (*Figure 14-2*). The primer sets off the delay element that burns into the detonator and igniter; this chain reaction is ended by bursting or burning of the filler in the grenade body. This entire action requires only a few seconds, so stay alert when you are handling and throwing hand grenades.

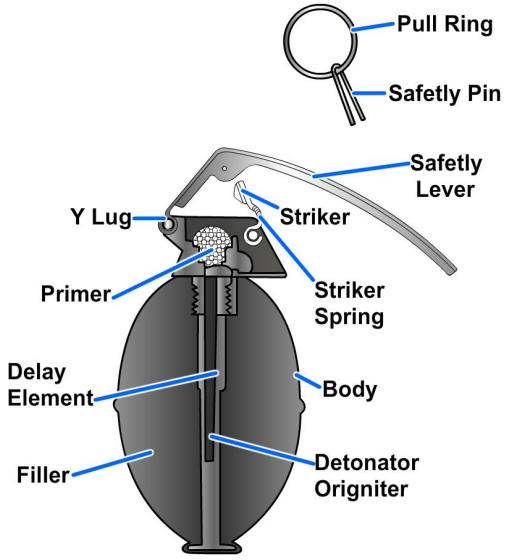


Figure 14-2 — The functioning of the grenade.

WARNING

Once the safety pin of this grenade is removed, the grenade is armed and **MUST** be thrown. Do **NOT** attempt to replace the safety pin.

1.2.0 Types and Purposes of Grenades

There are several varieties of hand grenades designed for many purposes. Grenades can be classified into one of these three general types:

1. Fragmentation
2. Chemical
3. Practice and training grenades

1.2.1 Fragmentation Grenades

Fragmentation grenades are used to produce casualties as a result of the high-velocity projection of fragments from the grenade case. The M67 fragmentation grenade (*Figure 14-3*) is the standard grenade used by Seabees. It has a smooth, sheet-metal body and is shaped like a ball. Its outer case is lined on the inside with a serrated wire coil. Its characteristics are listed in *Table 14-1*.



Figure 14-3 — M67 fragmentation grenade.

Interaction Available

Table 14-1 — Components and Characteristics of M67 Fragmentation Grenade

COMPONENTS AND CHARACTERISTICS	DETAILS
Body	Steel sphere with a scored steel spring for fragmentation
Filler	6.5 ounces of Composition B explosives
Fuze	M213
Safety Features	Safety clip Safety pin and pull ring with confidence clip Safety lever
Fuze Delay	4 to 5.5 seconds
Total Weight	14 ounces
Average Throwing Distance	35 meters
Effective Casualty-Producing Radius	15 meters
Killing Radius	5 meters
Colors and Markings	Olive drab body with yellow markings

WARNING

Although the killing radius of the M67 grenade is 5 meters and the casualty-producing radius is 15 meters, fragments can disperse as far as 230 meters.

1.2.2 Chemical Grenades

Chemical grenades are chemical-filled munitions designed to be thrown by the individual or the M203. Chemical grenades are used for incendiary, screening, signaling, training, and riot control purposes as well as booby traps.

Amongst the most commonly used chemical grenade is the M47 chloracetophenone (CS) riot control hand grenade (*Figure 14-4*). This is a special purpose bursting type of munition used for control of riots and for training purposes. The grenades are filled with CS, a type of tear gas that causes irritation and watering of the eyes, resulting in temporary, partial, or total blindness. The body of the grenade is spherical and is made of plastic. It contains about 3.5 ounces of CS and weighs about 7.5 ounces.

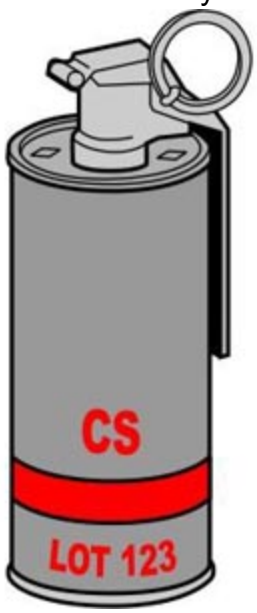


Figure 14-4 — M47 CS chemical grenade.

This grenade does not have a safety lever as do other grenades. To prevent the grenade from activating after the safety pin is removed, maintain pressure on the top of the arming sleeve with the thumb of your throwing hand.

The radius of the burst is approximately 6 meters, but fragments of the plastic body occasionally fly as far as 27 meters. Effective portions of the agent may be carried as far as 75 to 100 meters downwind. Personnel using these grenades should wear protective gas masks.

1.2.2.1 Illumination Grenades

The MK1 illuminating grenade's (*Figure 14-5*) main use is illumination of terrain during night operations. This grenade provides about 55,000 candlepower for a period of 25 seconds. The MK1 grenade may also be used as an incendiary grenade to start fires in dry grass, leaves, or brush. When the two halves of the body are separated by the burning of an illuminating charge, they project with considerable velocity. Friendly forces should take cover until the illumination can be seen.



Figure 14-5 — MK1 illuminating grenade.

1.2.2.2 Incendiary Grenades

The AN-M14 incendiary (thermite) hand grenade is cylindrical in shape and has a sheet-metal body with emission holes in the top (*Figure 14-6*). It weighs 32 ounces and contains a filler of 26.5 ounces of TH3 thermite mixture. An igniting fuze sets fire to the thermite filler after the normal delay (0.7 to 2.0 seconds). The thermite filler bums for approximately 40 seconds at a temperature of about 4300°F. A portion of the thermite filler changes into molten iron that flows out of the grenade and produces intense heat over a small area. The molten iron ignites or fuses whatever it touches. It is used to ignite combustible materials and to destroy all types of equipment. The characteristics of the AN-M14 TH3 incendiary hand grenade are listed in *Table 14-3*.



Figure 14-6 — AN-M14 incendiary grenade.

Table 14-3 — Characteristics of AN-M14 TH3 Incendiary Hand Grenade

COMPONENTS AND CHARACTERISTICS	DETAILS
Body	Sheet metal
Filler	26.5 ounces of thermite (TH3) mixture
Fuze	M201A1
Safety Features	Safety clip (may be issued with or without a safety clip) Safety pin and pull ring with confidence clip Safety lever
Fuze Delay	0.7 to 2.0 seconds
Total Weight	32 ounces
Average Throwing Distance	25 meters
Effects	A portion of thermite mixture is converted to molten iron, which burns at 4,330 °F. The mixture fuzes together the metallic parts of any object that it contacts. The thermite filler can burn through a 1/2-inch homogenous steel plate. It produces its own oxygen and burns under water.
Colors and Markings	Gray with purple markings, has a single purple band (current grenades) Under the standard color-coding system, incendiary grenades are light red with black markings.

WARNING

Avoid looking directly at the incendiary hand grenade as it burns. The intensity of the light is hazardous to the retina and can cause permanent eye damage.

1.2.2.3 M18 Smoke Grenade

The M18 colored smoke hand grenade (*Figure 14-7* shows a yellow smoke grenade) is used as a means of communication. These grenades are self-contained units used to signal aircraft or to convey information through a prearranged signal. *Table 14-5* outlines its components and characteristics.



Figure 14-7 — M18 Yellow smoke grenade.

Table 14-5 — Characteristics of the M18 Colored Smoke Hand Grenade

COMPONENTS AND CHARACTERISTICS	DETAILS
Body	Sheet steel cylinder with four emission holes at the top and one at the bottom, which allows smoke to escape when the grenade is ignited
Filler	11.5 ounces of colored smoke mixture (red, yellow, green, or violet)
Fuze	M201A1
Safety Features	Safety clip (may be issued with or without a safety clip) Safety pin and pull ring with confidence clip Safety lever
Fuze Delay	0.7 to 2.0 seconds
Total Weight	19 ounces
Average Throwing Distance	35 meters
Effects	The grenade burns for 50 to 90 seconds with an average burn time of 60 seconds.
Colors and Markings	Light green body with black markings NOTE: The top of the grenade indicates the smoke color.

1.2.2.4 AN-M8 HC White Smoke Hand Grenade

The AN-M8 HC white smoke hand grenade (*Figure 14-8*) produces dense clouds of white smoke for signaling and screening. *Table 14-6* outlines its components and characteristics.

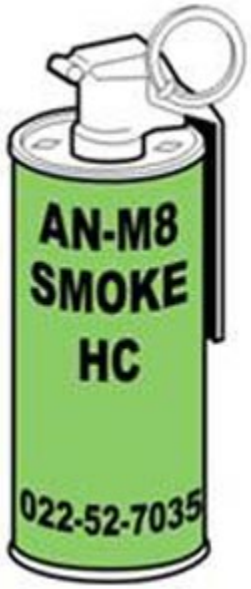


Figure 14-8 — AN-M8 HC white smoke grenade.

Table 14-6 — Characteristics of the AN-M8 HC White Smoke Grenade

COMPONENTS AND CHARACTERISTICS	DETAILS
Body	Sheet steel cylinder
Filler	19 ounces of Type C, HC smoke mixture
Fuze	M201A1
Safety Features	Safety clip (may be issued with or without a safety clip) Safety pin and pull ring with confidence clip Safety lever
Fuze Delay	0.7 to 2.0 seconds
Total Weight	24 ounces
Average Throwing Distance	30 meters
Effects	The grenade emits a dense cloud of white smoke for 105 to 150 seconds.
Colors and Markings	Light green body with black markings and a white top

WARNING

The AN-M8 HC hand grenade produces harmful hydrochloric fumes that irritate the eyes, throat, and lungs. It should not be used in enclosed or confined spaces unless personnel are wearing protective masks. Damaged AN-M8 HC grenades that expose the filler are hazardous. Exposure of the filler to moisture and air could result in a chemical reaction that will ignite the grenade.

1.2.3 Practice and Training Grenades

Practice and training grenades (*Figure 14-9*) are used for training personnel in the care, handling, and use of hand grenades before using service grenades. The M69 practice grenade simulates the functioning of service grenades to provide realism in training. Training grenades are completely inert and do not function in any way. The characteristics of the M69 practice grenade are listed in *Table 14-7*.



Figure 14-9 — M69 practice and training grenade.

Table 14-7 — Characteristics of M69 Practice Grenade

COMPONENTS AND CHARACTERISTICS	DETAILS
Body	Hollow steel sphere
Filler	None
Fuze	M228, which is inserted into the grenade body
Safety Features	Safety clip Safety pin and pull ring with confidence clip Safety lever
Fuze Delay	4 to 5.5 seconds
Total Weight	14 ounces
Average Throwing Distance	40 meters
Effects	Small puff of white smoke and a loud popping noise
Colors and Markings	Light blue with white markings; the safety lever of the fuze is light blue with black markings and a brown tip

1.3.0 Grenade-Throwing Procedures

The two primary objectives of a hand grenade training program are to develop your proficiency in grenade throwing and to overcome any fear that you may have of handling explosives.

Consider safety first when you are determining the proper method of holding the grenade. For maximum safety and throwing comfort, cradle the grenade in your throwing hand with the safety lever held in place by that part of your thumb between the first and second joints.

For right-handed personnel, hold the grenade upright *(Figure 14-10)*. This positions the pull ring so you can remove it easily with the index finger of your free hand. For left-handed personnel, invert the grenade (*Figure 14-11*) in your hand with the fingers and thumb of the throwing hand in the same position as right-handed personnel.



Figure 14-10 — Right-hand grip.



Figure 14-11 — Left-hand grip.

Not everyone throws in the same manner; it is difficult to establish firm throwing rules or techniques. However, there is a recommended method of throwing a grenade that can be mastered easily. By practicing the steps given below, you can develop your throwing proficiency to a point where your reaction to a target becomes immediate.

1. First, observe the target and establish the distance between your throwing position and the target area.
2. Hold the grenade at shoulder level with the grenade in your throwing hand and the index finger of your opposite hand grasping the pull ring (*Figure 14-12*). Remove the safety pin with a pulling, twisting motion. If the situation permits, you

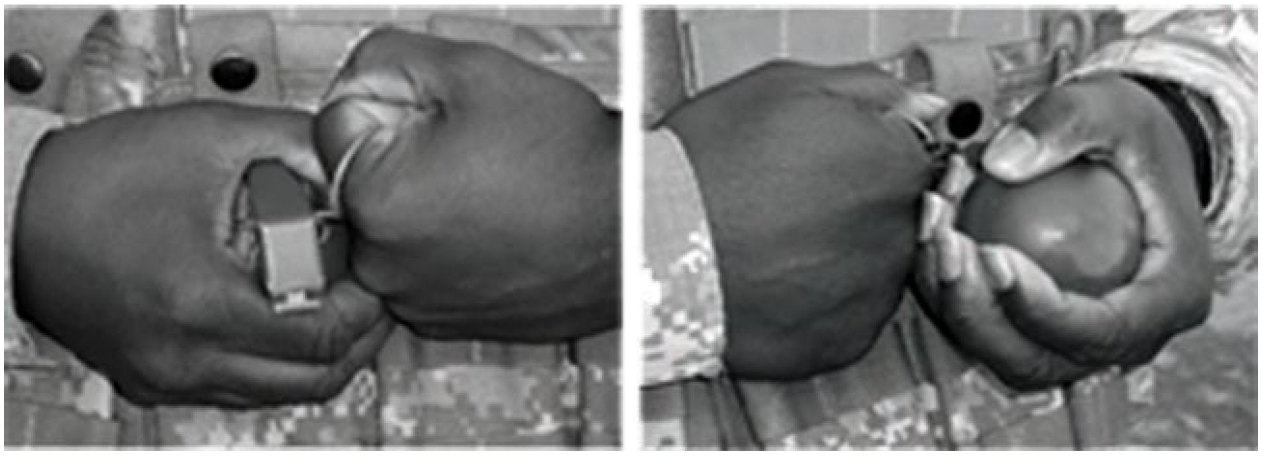


Figure 14-12 — Removing the grenade pin.

should observe removal of the safety pin.

NOTE

When the safety pin cannot be pulled out, squeeze the legs of the safety pin together to aid in its removal. However, if the grenade is not used, spread the legs of the safety pin for safety in carrying.

3. As you remove the safety pin, immediately look toward your target (*Figure 14-13, View A*).
4. Throw the grenade with an overhand throwing motion, keeping your eyes trained at all times on the target. Release the grenade somewhere forward of your body and in your general field of vision (*Figure 14-13, Views B and C*). In this way, you take advantage of your inherent hand-eye coordination.



Figure 14-13 — Throwing the grenade.

5. Follow through on your throwing motion beyond the point where you released the grenade (*Figure 14-13, View D*). This follow-through improves distance and accuracy and relieves the strain on your throwing arm.
6. When available, duck behind cover to avoid being hit by fragments of the grenade. When no cover is available, drop to the prone position with your helmet facing in the direction of detonation (*Figure 14-13, View E*). Although proper positioning techniques of throwing hand grenades are usually stressed during military training exercises, your position during a combat situation is dictated by the amount of available cover and the location of the target. The positions given below point out the use and limitations of each position.

1.3.1 Standing Position

The standing position is the most desirable and natural position from which to throw grenades. It allows personnel to obtain the greatest possible throwing distance. However, this position should only be used when cover and concealment is readily available. To throw grenades from the standing position follow the following procedures:

1. Observe the target to estimate the distance between the throwing position and the target area.
2. Assume a natural stance, with your weight balanced equally on both feet.
3. Prepare the grenade.
4. Hold the grenade shoulder high and the nonthrowing hand at a 45-degree angle with the fingers and thumb extended, joined, and pointing toward the intended target.
5. Throw the grenade overhand so that the grenade arcs, landing on or near the target.
6. Allow the motion of the throwing arm to continue naturally once the grenade is released.
7. Seek cover to avoid being hit by fragments or direct enemy fire. If no cover is available, drop to the prone position facing the direction of the grenade's detonation.

1.3.2 Prone-to-Standing Position

When exposure time is more important than accuracy and cover and concealment is not readily available, the prone-to-standing position can be used to immediately suppress an area. To throw a grenade from the prone-to-standing position, observe the following:

1. Lie down on your stomach with your body parallel to the grenade's intended line of flight (*Figure 14-14, View A*).
2. Hold the grenade at chest level.

3. Place the hands in a push-up position, and stand up while holding the grenade in the throwing hand (*Figure 14-14, View B*).

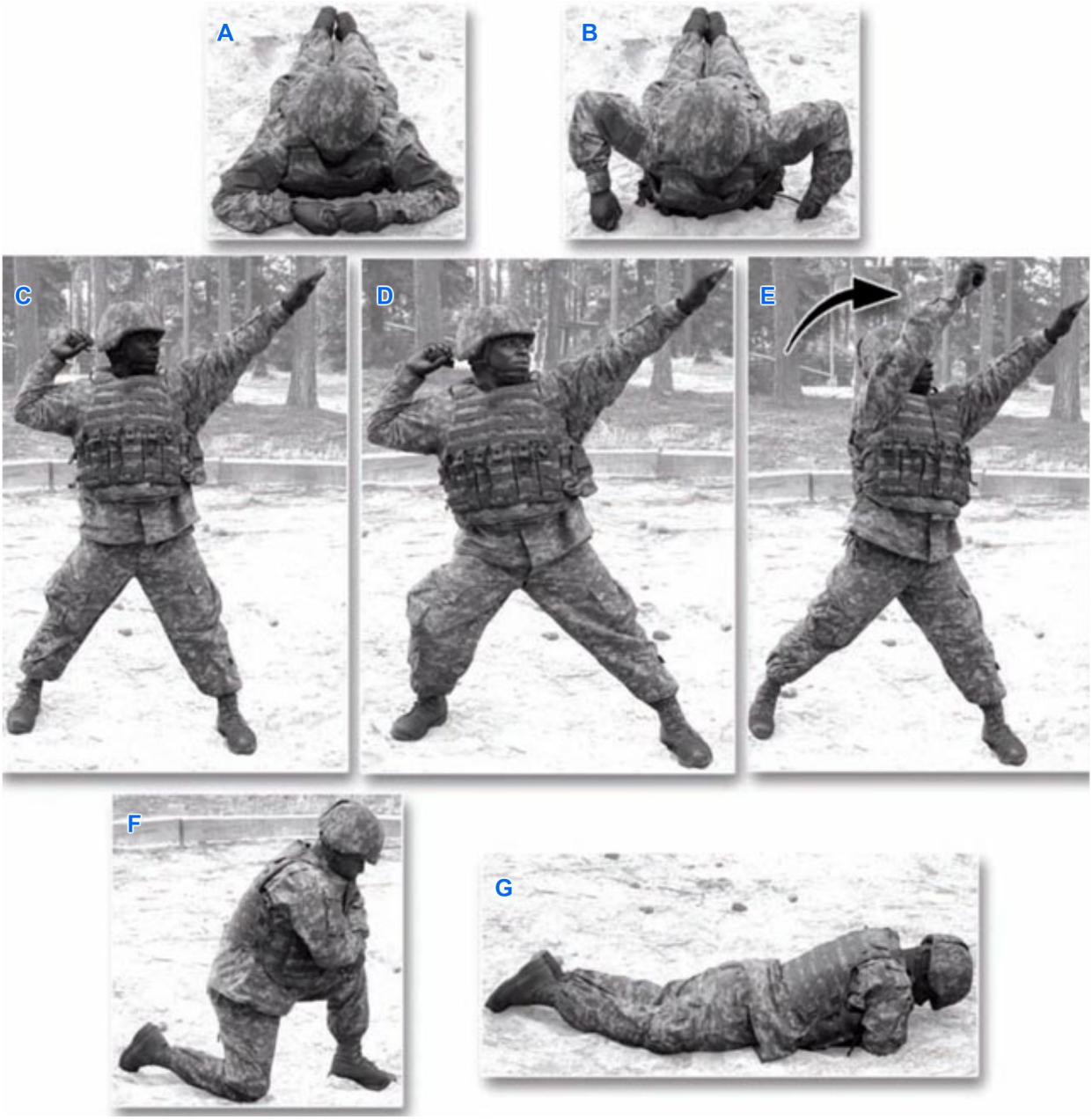


Figure 14-14 — The prone-to-standing postion for throwing a grenade.

4. Assume a good standing position, if the situation permits.
5. Prepare the grenade.
6. Hold the grenade shoulder high and the nonthrowing hand at a 45-degree angle with the fingers and thumb extended, joined, and pointing toward the intended target (*Figure 14-14, Views C and D*).
7. Throw the grenade overhand so that the grenade arcs, landing on or near the target (*Figure 14-14, View E*).

8. Allow the motion of the throwing arm to continue naturally once the grenade is released (*Figure 14-14, View F*).
9. After throwing the grenade, drop to the ground on the stomach and press flat against the ground (*Figure 14-14, View G*).

1.3.3 Kneeling Position

The kneeling position reduces the distance a Seabee can throw a grenade. It is used primarily from behind low-level ground cover. To throw a grenade from the kneeling position, observe the following:

1. Observe the target to mentally estimate the throwing distance.
2. Prepare the grenade while behind cover.
3. Bend the non-throwing knee at a 90-degree angle, placing that knee on the ground. Keep the throwing leg straight and locked, with the side of the boot firmly on the ground (*Figure 14-15, View A*).



Figure 14-15 — Throwing a grenade from the kneeling position.

4. Move the body to face sideways, toward the target position.
5. Hold the grenade shoulder high and the non-throwing hand at a 45-degree angle with the fingers and thumb extended, joined, and pointing toward the intended target (*Figure 14-15, View B*).
6. Throw the grenade overhand so that the grenade arcs, landing on or near the target. Push off with the throwing foot to give added force to the throw.

7. Allow the motion of the throwing arm to continue naturally once the grenade is released (*Figure 14-15, View C*).
8. Drop to the prone position or behind available cover to reduce exposure to fragmentation and direct enemy fire (*Figure 14-15, View D*).

1.3.4 Prone-to-Kneeling Position

The prone-to-kneeling position enables the Seabee to throw the grenade farther and is performed for the same reason as the prone-to-standing position; time to throw is more important than accuracy. To throw a grenade from the prone-to-kneeling position, observe the following:

1. Lie on your stomach with your body parallel to the grenade's intended line of flight.
2. Hold the grenade at chest level (*Figure 14-16, View A*).
3. Place the hands in a push-up position, and assume the kneeling position while holding the grenade in the throwing hand. Assume a good kneeling position, if the situation permits (*Figure 14-16, View B*).
4. Prepare the grenade.
5. Hold the grenade shoulder high and the non-throwing hand at a 45-degree angle with the fingers and thumb extended, joined, and pointing toward the intended target (*Figure 14-16, View C*).
6. Throw the grenade overhand so that the grenade arcs, landing on or near the target (*Figure 14-16, View D*).
7. Allow the motion of the throwing arm to continue naturally once the grenade is released (*Figure 14-16, View E*).
8. After throwing the grenade, drop to the ground on your stomach and press flat against the ground (*Figure 14-16, View F*).



Figure 14-16 – The prone-to-kneeling postion for throwing a grenade.

1.3.5 Alternate Prone Position

The alternate prone position reduces both distance and accuracy and is used when rising to engage a target is not safe. To throw a grenade from the alternate prone position, observe the following:

1. Lie down on your back, with your body parallel to the grenade's intended line of flight (*Figure 14-17, View A*).
2. Hold the grenade at chin/chest level.
3. Prepare the grenade.
4. Cock the throwing leg at a 45-degree angle, maintaining knee-to-knee contact and bracing the side of the boot firmly on the ground (*Figure 14-17, View B*).

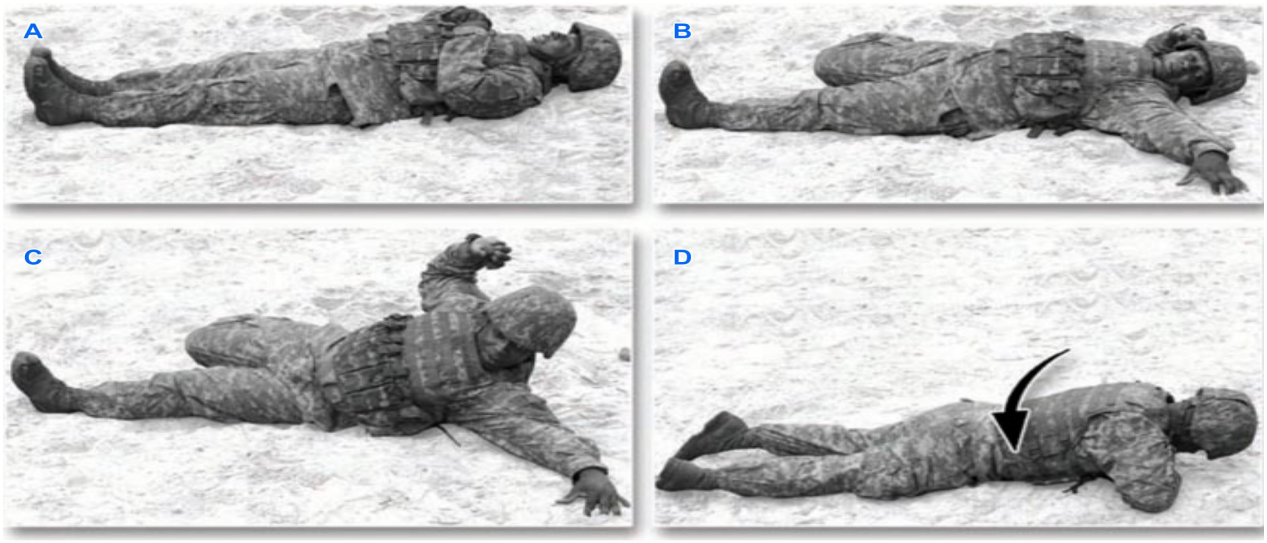


Figure 14-17 — The alternate prone position for throwing a grenade.

5. Hold the grenade 4 to 6 inches behind the ear with the arm cocked for throwing.
6. With the free hand, grasp any object that will provide additional leverage to increase the throwing distance (*Figure 14-17, View C*).
7. Throw the grenade, and push off with the rearward foot to give added force to the throw.

⚠ CAUTION ⚠

Do not lift the head or body when attempting to throw the grenade as this may cause exposure to direct enemy fire.

8. After throwing the grenade, roll over onto your stomach and press flat against the ground (*Figure 14-17, View D*).

1.4.0 Hand Grenade Safety

This section deals with safety precautions that must be observed by the handlers and throwers of all hand grenades and by other persons who may be located within the danger area of the grenade.

Any handler or thrower of a casualty-producing hand grenade or person who is within the danger area (approximately 50 meters) of the grenade must wear a helmet.

WARNING

No hand grenades, other than fused practice grenades, should be defuzed by any person **EXCEPT** qualified and authorized ordnance maintenance personnel.

When handling grenades armed with an impact detonating fuze, you should **NOT** release the safety lever before throwing **NOR** observe the impact of the grenade. Wait at least 5 minutes before approaching a dud. If a grenade armed with an impact detonating fuze is accidentally dropped after the safety pin has been removed, the grenade **MUST** be picked up and thrown to a safe area. Under **NO** circumstances should the grenade be kicked or tossed into a sump or ditch, since any sudden jarring of the grenade after the arming delay is expended causes detonation.

WARNING

Do **NOT** remove the safety pin on a grenade until you are ready to throw it. In training, once you remove the safety pin, it must **NOT** be placed back into the grenade; the grenade must be thrown.

Only someone experienced in ordnance disposal should attempt to recover, handle, or otherwise tamper with a dud grenade.

If you should accidentally drop a casualty-producing hand grenade after pulling the safety pin, shout GRENADE to alert other personnel in the area and ensure that the grenade is picked up and thrown in a low arc into a safe area.

Under no circumstances should you attach grenades to clothing or equipment by the PULL RING. Attaching grenades to clothing or equipment by the pull ring can easily result in the safety pin being accidentally removed from the grenade.

When handling a noncasualty-producing hand grenade, such as the chemical type, you should not be closer than 10 meters to the grenade while it burns. You should not look directly into the thermite mixture since it may cause temporary blindness or even permanent eye damage.

The safety lever of a chemical hand grenade should not be released before the grenade is thrown because of its extremely short time-delay period.

Riot control hand grenades should not be thrown into a closed area nor should they be detonated within 5 meters of personnel.

Smoke hand grenades should not be used in a closed area.

At least a 30-minute waiting period should elapse before a chemical grenade dud is approached—and ONLY by authorized ordnance disposal personnel.

2.0.0 LAND MINES

2.1.0 Characteristics and Functioning

A land mine is an explosive device that is designed to destroy or damage equipment or personnel. Equipment targets include ground vehicles, boats, and aircraft. A mine is detonated by the action of its target, the passage of time, or controlled means. There are two types of land-based mines—Antitank (AT) and Antipersonnel (AP). Mines generally consist of the following parts *Figure 14-18*:

- Firing mechanism or other device (sets off the detonator or igniter charge)
- Detonator or igniter (sets off the booster charge)
- Booster charge (may be attached to the fuse or the igniter or be part of the main charge)
- Main charge (in a container; usually forms the body of the mine)
- Casing (contains all the above parts)

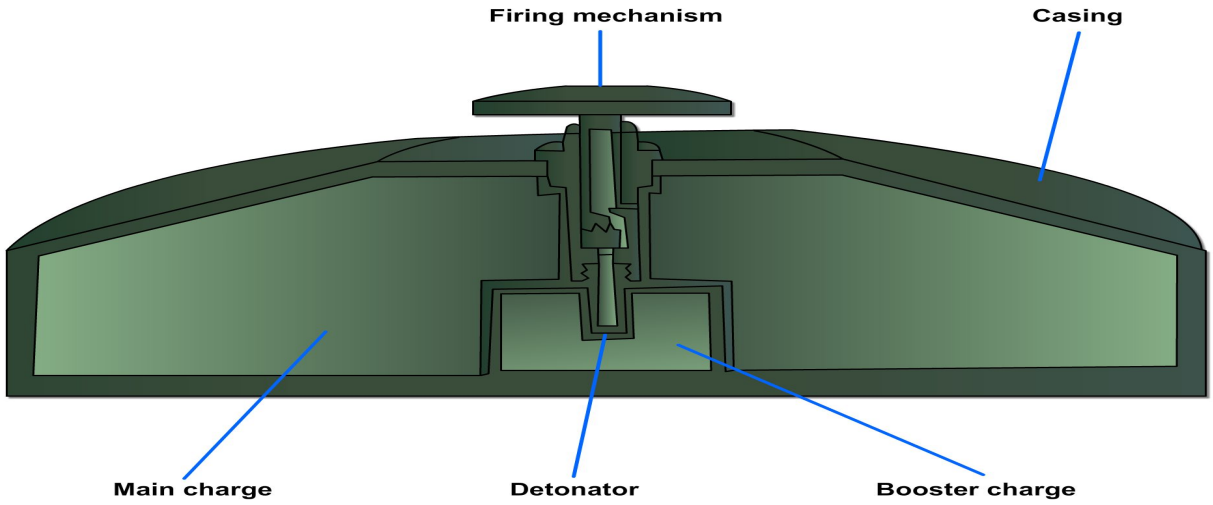


Figure 14-18 — Land mine and its components.

2.2.0 Components and Initiating Actions

A firing mechanism prevents the mine from exploding until it makes contact with, or is influenced by, its target. Once a mine has been armed, the firing mechanism may be actuated by the following methods:

- Applying pressure (including tilt rod)
- Pulling a trip wire
- Releasing tension or breaking a trip wire
- Releasing pressure
- Passage of time (time-delay mechanism)

- Impulses
    - Electrical
    - Vibration
    - Magnetic-influence
    - Electromagnetic-frequency
    - Infrared-sensored
    - Acoustic

To arm some mines, you must position the igniter, set the mechanism properly, and disengage the safety device (usually by removing a safety pin). The fuse is the initial component in the firing chain; it has a Low-Explosive (LE) powder but is highly sensitive. The fuse is actuated by an initiating action. Although mines are issued with a standard fuse, alternate fuses are issued separately for some mines.

⚠ CAUTION ⚠

Except for the M18A1 Claymore antipersonnel mine described below, mines are **NOT** authorized for use by the Naval Construction Force (NCF). Personnel who encounter other types of mines should not attempt to disarm or use them or handle them in any manner. When located in the field, you should mark the mines clearly and furnish their locations to the battalion security officer or authorized ordnance disposal personnel.

2.3.0 M18A1 Claymore Mine

The M18A1 Claymore antipersonnel mine, currently the only mine authorized for use by the Seabees, is used only as an electrically-controlled, one-shot weapon. It is used for support of other weapons during the final protective fire of the unit.

The M18A1 Claymore antipersonnel mine (*Figure 14-19*) was standardized in 1960. It is a directional, fixed fragmentation mine and is designed primarily for use against massed infantry attacks. The Claymore mine is equipped with a fixed plastic, slit-type sight, adjustable legs, and two detonator wells.

The mine weighs about 3 1/2 pounds and is 8 1/2 inches long, 1 3/8 inches wide, and 3 1/4 inches high. The outer surface is a curved rectangular, olive drab colored, molded plastic case. The front portion of the case has a fragmentation face containing steel spheres embedded in a plastic matrix (enclosure). The back portion of the case contains 1 1/2 pounds of Composition C4 (composite explosive).



Figure 14-19 — The M18A1 Claymore antipersonnel mine.

When detonated, the M18A1Claymore antipersonnel mine projects steel fragments over a 60-degree fan-shaped pattern approximately 2 meters high and 50 meters wide at a range of 50 meters (*Figure 14-20*). These fragments are moderately effective up to a range of approximately 100 meters and can travel up to 250 meters. The optimum effective range—the range at which the most desirable balance is achieved between lethality and area coverage—is 50 meters.

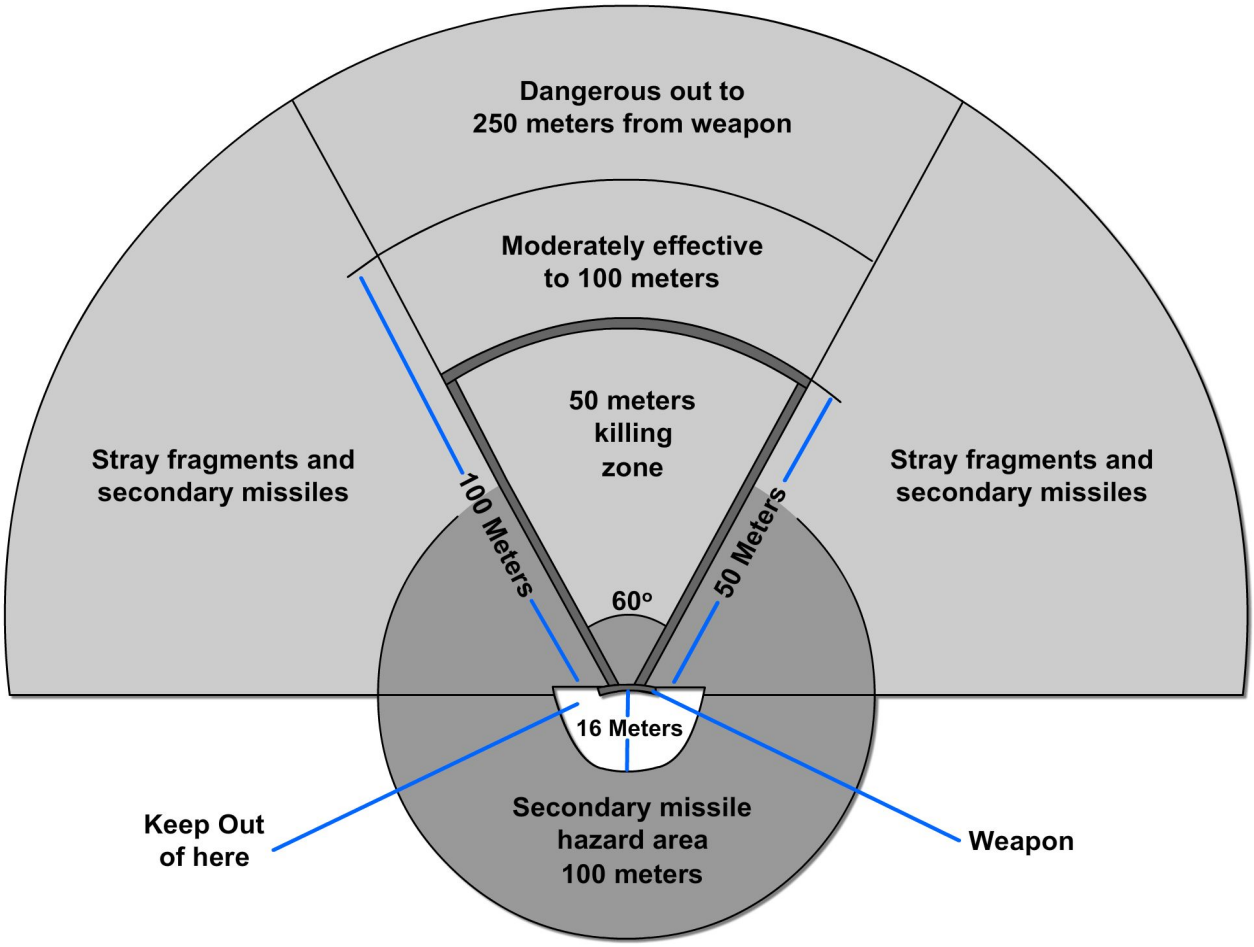


Figure 14-20 — Range and effects of the M18A1 Claymore antipersonnel mine.

2.4.0 M57 Firing Device

One M57 firing device (*Figure 14-21*) is issued with each M18A1 Claymore antipersonnel mine. The device is a hand-held pulse generator. A squeeze of the handle produces a double 3-volt electrical pulse of sufficient energy to fire the electric blasting cap through the 100 feet of firing wire issued with the mine. On one end of the firing device is a rubber connecting plug with a dust cover.

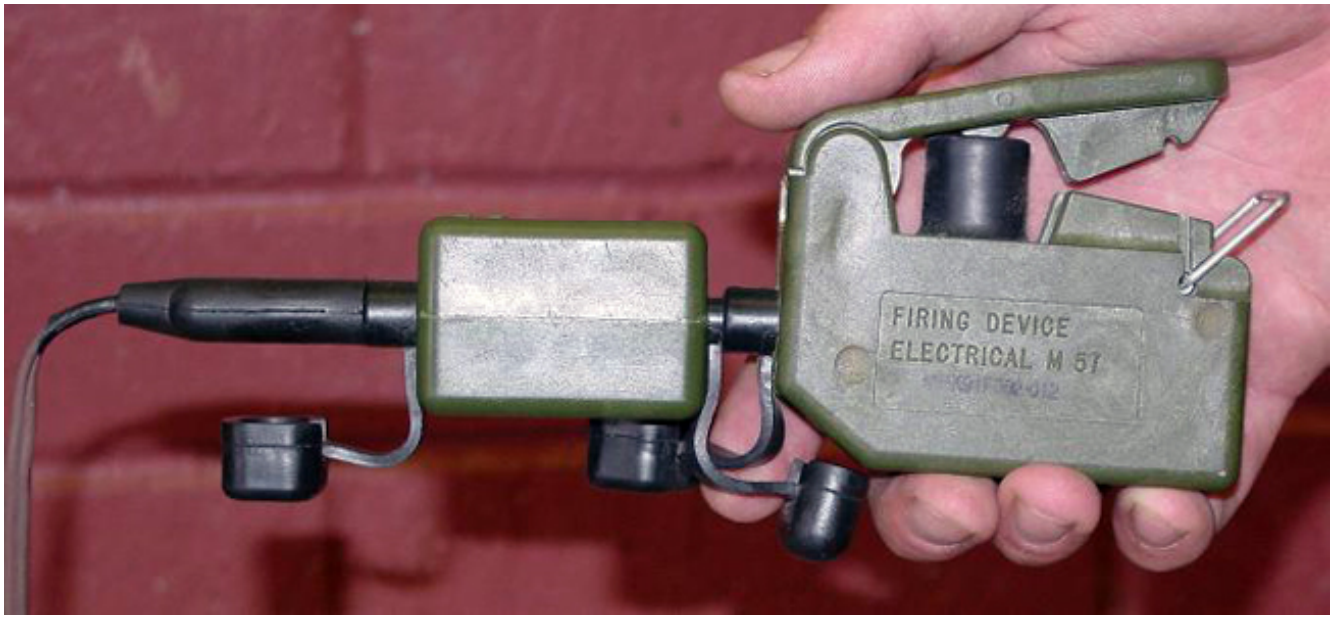


Figure 14-21 — The M57 firing device.

The safety bail on the firing device has two positions. In the upper SAFE position, it acts as a block between the firing handle and the generator. In the lower FIRE position, the generator can be activated.

2.5.0 Installation and Firing

Complete instructions for installing, arming, testing, and firing the M18A1 Claymore antipersonnel mine are on the back of the packing bag (*Figure 14-22*), and should be carefully followed.

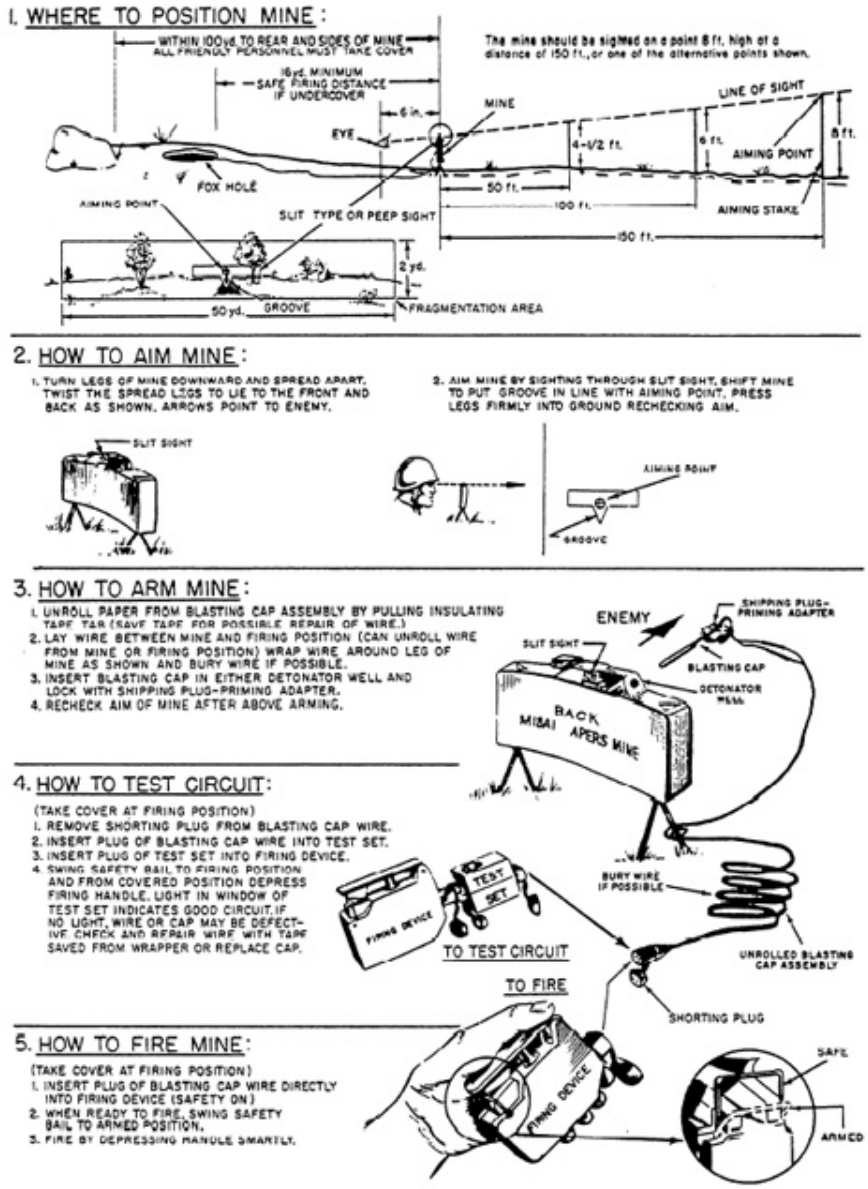


Figure 14-22 — The M18A1 Claymore antipersonnel mine setup instructions on bag.

2.6.0 Coverage and Methods of Fire

As the M18A1 Claymore antipersonnel mine can only be fired once, fire discipline is of major importance. The mine should not be used against single personnel targets; rather, it should be used for its intended purpose—massed personnel. It should be detonated when lead elements of an enemy formation approach within approximately 20 to 30 meters of the mine.

Effective coverage of the entire front of a position by mines can be accomplished by placing them in a line no closer together than 5 meters and no farther apart than 45 meters. A preferred lateral and rearward separation distance is approximately 25 meters.

WARNING

It is NOT authorized for Seabees to detonate the M18A1 Claymore antipersonnel mine without the use of the M57 firing device

3.0.0 PYROTECHNICS

Pyrotechnic signals can be used as a means of communication and signals, obscuration, warning of an intruder, and for simulating enemy fires. There are two classifications of pyrotechnic communication signals: handheld signals and ground smoke signals. Both types of signals come in varied color patterns. Personnel can use these patterns to coordinate troop movements and, in the case of an emergency, designate pick-up points.

3.1.0 Trip Flares

A trip flare is used primarily to illuminate and to give warning of attacking or infiltrating enemy troops. Normally, it is placed in the path of, and activated by, an advancing enemy. Trip flares are usually available to an individual or small unit and can provide temporary close-in illumination. Trip flares are not suitable for producing continuous illumination and have little, if any, application in other than defensive operations. Other uses for trip flares include:

- Provide early warning of infiltration of enemy troops or signaling.
- Illuminate an immediate area.
- Ignite fires.
- Identify firing ports.
- Force the enemy to withdraw.
- Destroy small, sensitive pieces of equipment (in the same manner as an incendiary grenade).

The M49A1 trip flare (*Figure 14-23*) resembles a hand grenade in size and shape, except that it is provided with a bracket for attachment to a tree or post and a trigger mechanism for firing. The components and characteristics of the M49A1 trip flare is contained in *Table 14-8*.

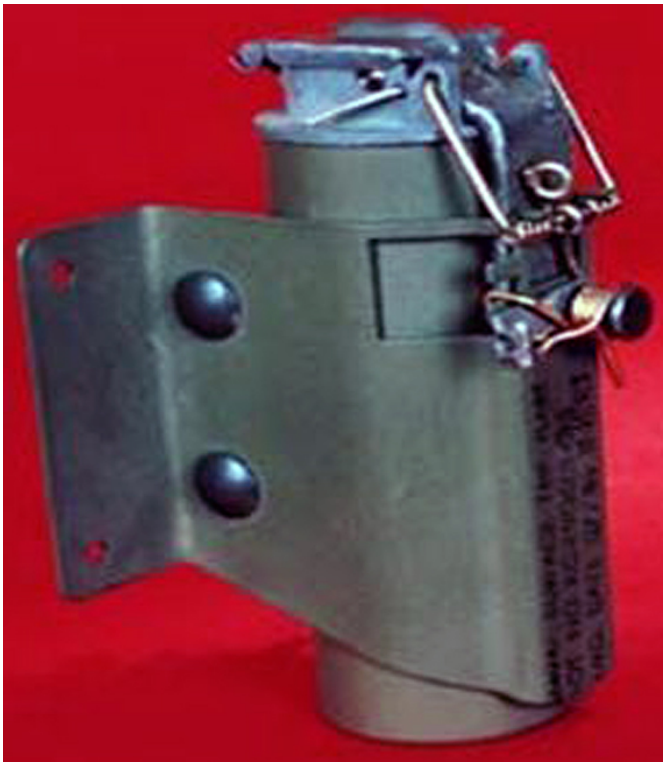


Figure 14-23 — M49A1 trip flare.

Table 14-8 — Characteristics of the M49A1 Surface Trip Flare

COMPONENTS AND CHARACTERISTICS	DETAILS
Body	Aluminum
Weight	0.75 pounds
Length	4.85 inches
Diameter	3.10 inches
Method of Activation	Trip wire (50 feet)
Filler	Illumination composition
Primer	Percussion M42
Safety Features	The trigger is attached to the exterior of the mounting bracket. The lever is hinged to the cover and is held in position by the safety clip when unarmed. A pull on the trip wire causes either the trigger tongue or pull pin to release the lever, which in turn permits the firing pin to strike the primer. The primer sets off the intermediate charge, and the intermediate charge ignites the first-fire composition on the ignition increment of the flare.
Fuze Delay	0 seconds
Effects	The trip flare produces 35,000 candlepower illumination for 55 seconds (minimum). The area of illumination is an approximately 300-meter radius.
Colors and Markings	Olive drab body with black markings

WARNING

Surface trip flares can cause fires when thrown on dry tinder. The minimum safe distance from an ignited surface trip flare is 2 meters because of sparks and the popping of burning magnesium. Never look directly at a burning surface trip flare. The intense flame can injure your eyes. At close ranges, surface trip flares may damage night vision devices and sights. Do **NOT** attempt to cook off a trip flare. The fuze does **NOT** have a time delay.

The location chosen for the flare should be to the right (looking toward the enemy) of the field to be illuminated, so the trip wire, when attached, runs to the right of the flare when facing the trigger. Using two of the nails supplied, nail the holder plate with ends of the two tabs upward to a stake, post, or suitable support at the height desired for the trip wire (usually 15 to 18 inches above the ground). Mount the flare by sliding the two square holes of the anchor clip over the mating tabs on the holder and press the flare down until it is locked in position. If desired, a third nail may be driven through the hole in the lower end of the anchor clip.

Fasten one end of the trip wire to the post, stake, or other rigid object at the desired distance from the flare (usually about 12.2 meters) and at the right of the flare when facing the flare trigger.

Press the fuze safety lever down with one hand and rotate the trigger one-quarter turn counterclockwise against the spring pressure with the other hand to the vertical position, so the lower end of the safety lever is behind the upper end of the trigger.

Pull the loose end of the trip wire taut and fasten it to the hole in the lower end of the trigger.

Check to see that the trip wire is taut and fastened at both ends and the trigger is vertical with the fuze safety lever behind the upper end of the trigger so when the pull ring and safety pin are withdrawn, the safety lever is still held by the trigger.

Hold the lever with one hand while carefully withdrawing the pull ring and safety pin from the flare.

Carefully release the hold on the safety lever, while making sure the lever is held in place by the upper end of the trigger.

To remove a trip flare, carefully depress the safety lever to align the holes in the lever and the fuze and insert the safety pin. Detach the trip wire from the trigger while holding the safety lever against the flare and rotate the trigger to its original position. Remove the nails from the holding plate and the anchor clip. Return the flare to its original position and packing.

3.2.0 Handheld Signals

Star clusters, star parachutes, and smoke parachutes are issued in an expendable launcher that consists of a launching tube and firing cap *(Figure 14-24).*



Figure 14-24 — Handheld pyrotechnic signal.

When in bulk, communication signals are secured in shipping containers *(Figure 14-25).* Personnel should inspect the shipping container upon receipt. Shipping containers that are damaged should not be opened; they should be returned to the Ammunition Supply Point (ASP), or disposed of, using the methods outlined in the unit Standard Operating Procedures (SOPs).



Figure 14-25 — Handheld signal shipping container.

There are two types of communication signal shipping containers.

M548 metal container — contains 24 -handheld signals, individually secured in plastic containers *(Figure 14-25).*

Wood Ammunition Box Container — contains 36 -handheld signals, sealed in plastic barrier bags *(Figure 14-26)*. Each barrier bag contains 18 -hermetically sealed metal containers. Each sealed container contains one handheld signal.

Upon removing the sealed barrier bags from the shipping container *(Figure 14-26)*, personnel should inspect each barrier bag and identify any of the following discrepancies:

- The barrier bag has been damaged.
- The seal on the barrier bag show signs of tampering.

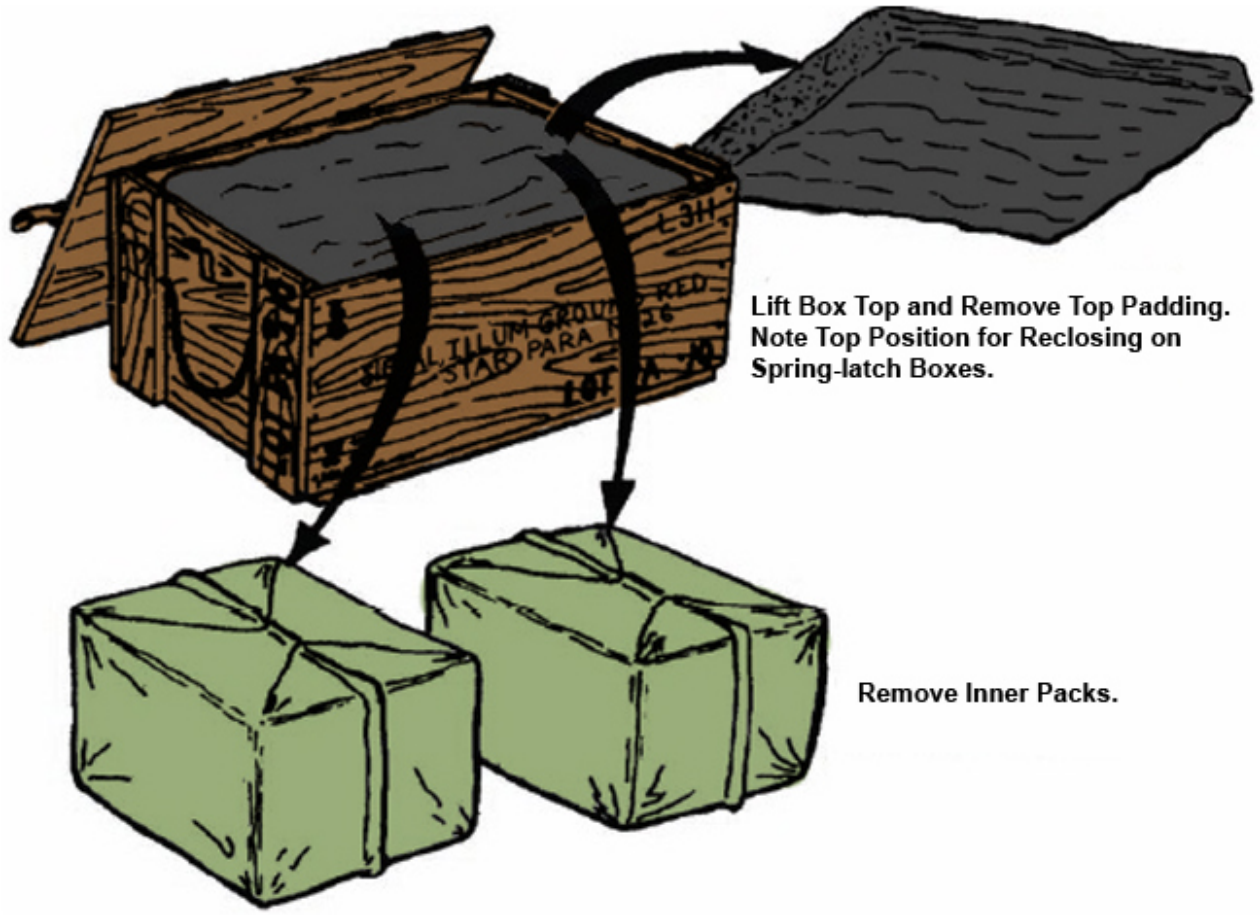


Figure 14-26 — Handheld signal barrier bag.

⚠ CAUTION ⚠

Do not open hermetically sealed (air tight) containers until ready for use. A signal exposed to moisture may not function.

3.2.1 Removing Handheld Signal From Container

3.2.1.1 Handheld Signal Sealed Steel Container

Open the handheld signal from a hermetically sealed steel container by using the key attached to the container *(Figure 14-27)*.

1. Remove the sealing strip.
2. Remove the top of the container.
3. Remove any padding pieces from the container.
4. Remove the signal.

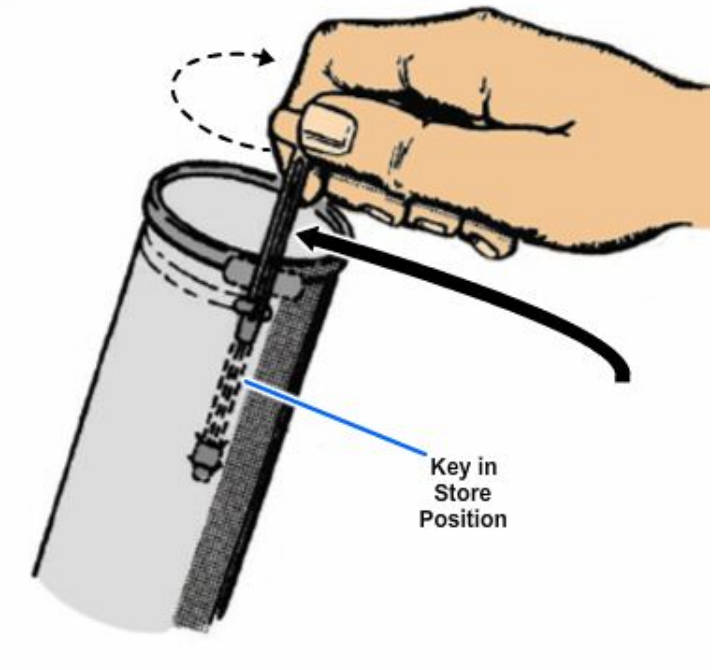


Figure 14-27 — Handheld signal sealed container.

3.2.1.2 Handheld Signal Plastic Sealed Container

To open the handheld signal plastic sealed container *(Figure 14-28),* use the steps shown below.



Figure 14-28 — Handheld signal plastic sealed container.

1. Hold the container in one hand.
2. Twist the end cap counterclockwise with the other hand.
3. Remove the signal.

3.2.2 Inspecting Handheld Signal

Once the signal has been removed from the container *(Figure 14-29)*, personnel should inspect the signal and identify any of the following discrepancies:

- Corrosion is on the launcher tube.
- Holes are visible in the launcher tube.
- The forward-end seal is broken or damaged.
- The firing pin is not present.
- The primer is not intact (is dented).
- The color-coded forward-end seal does not match the color listed on the data plate.



Figure 14-29 — Handheld signal removed from the individual container.

NOTE

If any of the discrepancies are found upon receipt of newly issued handheld signals, personnel should return the signal and individual container to the issuing person or dispose of it IAW the unit SOP.

Before securing handheld communication signals, personnel should take the following safety precautions:

- Ensure the launcher tube is not bent or punctured.
- Check the launcher tube for corrosion or dirt.
- Ensure the forward-end seal is not broken or damaged.
- Ensure the firing pin is present and the primer is intact (not dented).

Personnel should check handheld communication signals daily to ensure they are free of foreign material and they are not damaged.

Personnel should carry handheld communication signals IAW the unit SOP. When carrying handheld communication signals, personnel should adhere to the following guidelines:

- Ensure the communication signal is placed in a secure, dry area.

CAUTION

Duds or improper functioning could occur if exposed to moisture for long periods of time. Open just before use.

- Do not put adhesive tape around any portion of the handheld communication signal.

WARNING

Do not bend, tamper, modify, or otherwise alter a handheld communication signal. Do not tape any portion of the launcher or firing mechanism.

3.2.3 Using Handheld Signal

To safely use a handheld signal, personnel must properly determine the type and color of the pyrotechnic signal to be used, and safely launch the signal. When choosing a pyrotechnic signal, personnel must consider the signal's intensity and color.

Intensity — Handheld colored pyrotechnic signal flares burn at different intensities.

Color — Determining specific colors at night is not difficult. However, personnel should avoid using red and green star clusters near aircraft.

CAUTION

Avoid signaling aircraft at night with star clusters. Red and green star clusters can be mistaken for tracers causing the aircraft to open fire on the friendly ground element or to withdraw.

In daylight, personnel should adhere to the following considerations; it can be difficult to differentiate between white and green, depending on lighting conditions.

- Green is very pale in daylight and is especially difficult to detect in fog, haze, or smoke-filled skies. In fact, white flares are easier to detect in daylight than green.
- White flares can be mistaken for illumination flares.
- Red may be difficult to detect when launched in a position that forces the observer to see it near a vivid sunrise or sunset.

To fire handheld signals follow the steps below.

1. Observe the surrounding area to ensure that you have overhead clearance.
2. Grasp the signal firmly with your nonfiring hand—red-knurled band down—with your little finger above the red band *(Figure 14-30, View A)*.
3. With your firing hand, withdraw the firing cap from the upper end of the signal *(Figure 14-30, View B).*
4. Point the ejection end of the signal up and away from your body, and push the firing cap onto the signal until the open end of the cap is aligned with the red band *(Figure 14-30, View C)*.
5. Hold the signal away from your body and at the desired trajectory angle.

CAUTION

When firing handheld signals by hand, avoid contact with the bones of the hand. This can result in injury to the hand. Instead, use the meaty portion of the hand.

WARNING

Turn your head away from the signal to avoid injury to your face and eyes from particles ejected by the small rockets.



A B C

Figure 14-30 — Firing a handheld signal.

6. Strike the bottom of the cap using a sharp blow with the palm of your firing hand *(Figure 14-31, View A)* or strike it on a hard surface *(Figure 14-31, View B)*,



Figure 14-31 — Firing a handheld signal (cont.).

keeping your nonfiring arm rigid.

3.2.4 Misfire

In the event of a misfire, follow the steps below.

1. While keeping the signal aimed, pull the cap back to the red knurled band, and rotate 90 degrees.
2. Make two more attempts to fire.
3. If it still does not fire, wait 30 seconds, keeping the arm rigid and the signal aimed overhead.
4. Return the cap to the ejection end of the signal and dispose of the signal IAW unit SOP.

3.2.5 Maintenance

When exposed to the environment, handheld signals require Preventive Maintenance Checks and Services (PMCS). The color-coded forward-end seal can deteriorate if exposed to moisture for long periods of time or submerged in water. If not removed, dirt or sand can cause the handheld signal to malfunction.

3.2.6 Cleaning

To clean the handheld signal, you should:

1. Wipe the dirt off the launcher tube and the firing cap using a clean, dry, lint-free cloth.
2. Remove any foreign matter or debris by using a fine-bristled camel hair brush.

3.3.0 M260 Illumination Ground Signal Kit

The M260 illumination ground signal/pen gun flare supports the small-unit leader in fire control, maneuver, and initiating operations such as ambushes. These signals are also a component of air crewmen's survival vest and are used for distress signaling or to identify ground locations for aircraft *(Figure 14-32)*.

WARNING

At close range, these signals can injure or kill if they strike a person.

When signaling an aircraft, do not aim directly at the aircraft; the signals, regardless of color, may appear to be small arms fire. Although the flares are small and usually burn out before reaching the ground, they can ignite fires.



Figure 14-32 — M260 illumination ground signal kit.

3.3.1 Inspection

Inspection of the M260 illumination ground signal kit at the unit level consists of a visual check of packaging materials. Do not open any moisture-proof container or barrier bag because the item must be protected from moisture just prior to use.

The most commonly encountered packaging defects are listed below.

- Outer containers (boxes) damaged, weathered, or rotted to the extent that contents are not protected

- Inner container damaged to the extent that contents are not protected or cannot be readily removed
- Container cap or closure not secured to the extent that contents are not protected
- Inner containers wet (except metal), rusted, molded, or mildewed
- Hardware or banding loose, missing, broken, or ineffective
- Handle or cleat missing or broken
- Contents loose to the extent that item may be damaged in handling

3.3.2 Storage

When storing the illumination ground signal kit you should take the following precautions.

- Select a level, well-drained site that is free from ignitable and flammable materials.
- Provide nonflammable or fire-resistant overhead covers (e.g., tarpaulin) for all items. Keep cover at least 6 inches (15.5 centimeters) from pile on the ends and at sides to permit circulation of air.
- Temporarily store unserviceable items in a segregated area.

3.3.3 Use

To operate an illumination ground signal kit, follow the procedures listed below.

1. Select the signal to be fired by color (if using the M186 pen flare kit). If the bandoleer contains more than one signal of the chosen color, use the one farthest from the lanyard.
2. Remove and discard the plastic cap (M185 and M186 only).
3. Cock the projector by moving the trigger to the safety slot (M185 and M186 only).
4. Carefully thread the projector onto the signal. Take care not to dislodge the trigger from the safety slot (M185 and M186 only).
5. Aim in the chosen direction.
6. Fire by moving the trigger to the bottom of the slot and releasing it with a snap.
7. If the expended signal is on the end of the bandoleer or if the signals between the expended signal and the end have been used, cut the bandoleer and discard the waste.
8. Return the partly used kit to the carrier bag, and seal with tape.

4.0.0 IMPROVISED EXPLOSIVE DEVICES (IEDs)

IEDs may be constructed out of any available material and contain various fillers, to include explosive, chemical, biological, or hazardous materials. IEDs may range in size from a cigarette pack or carton to a large vehicle.

The only limitations an enemy bomber faces are the availability of resources, personal ingenuity, and the degree or extent of “know how” required to facilitate construction—and in some cases application—of an IED.

IEDs are nonstandard, and usually fabricated from common materials. The mass quantities of cached, Captured Enemy Ammunition (CEA), and stockpiled munitions provide the explosive materials to “would be” enemy bombers.

The following are general mitigation measures in relation to the IED threat.

1. Trust your instincts. If something does not seem right—it probably isn’t. Be aware of your surroundings (situational awareness).
2. Watch the locals in your area of operation; are the familiar locals in the area? Are people moving away from you or your element, or are they acting or appearing nervous? Most bombers don’t blow up their own neighborhoods.
3. Be aware of news crews in the area for no apparent reason. Most bombers like their work filmed, but do not like any pictures taken of them.
4. Before each and every convoy or patrol, brief your personnel on the latest IED threat intelligence. Brief your personnel each and every time.
    a. Ascertain what types of items are currently in use.
    b. What are the known techniques, patterns, and likely locations of emplacement?
    c. Where in the area have items previously been placed?
    d. What intelligence do you have on your current route of march (primary and alternates)?
5. Rehearse actions (battle drill) for reacting to a possible Improvised Explosive Device.
6. Wear personal protective equipment (vests, helmets, and eye protection). They save lives!
7. Maintain speed and movement, whenever possible.
8. Maintain dispersion while conducting either mounted or dismounted operations.
9. Be cautious of choke points, vehicle breakdowns, bridges, one-way roads, traffic jams, sharp turns, etc.
10. If something stops movement, either mounted or dismounted, survey your immediate area for possible IEDs.

4.1.0 Reaction Upon Encountering a Possible IED

Stop all movement toward the possible IED and immediately evaluate your surrounding area for possible secondary IEDs.

- Do not approach the possible IED.
- Do not attempt to move the possible IED.
- If possible, avoid using any communication/electronic equipment within any previously established and secure exclusion area.

Establish security:

- Establish an area around the possible IED. Adjust the exclusion area based on Mission, Enemy, Terrain and Weather, Troops and Support Available, and Civil

considerations (METT-TC); local command policy/guidance, tactics, techniques and procedures, and SOPs.

- Search initial secure area for possible secondary explosive device(s) and hazards, while maintaining security.
- Identify potential enemy force observation/vantage points.
- Seek all available man-made or natural frontal and overhead cover.
- Avoid establishing a “reaction” pattern.
- Forward information to Higher Headquarters (HHQ) using standard 9-line Unexploded Ordnance (UXO) Report.
- Continue mission IAW HHQ guidance.

4.2.0 Identifying IEDs

Ever-changing recognition features for IEDs are based on the enemy’s capabilities and available resources. IEDs can be produced in varying sizes and can have different types of containers, function, and delivery methods. IEDs become more difficult to detect and protect against as the enemy becomes more sophisticated.

IEDs can be command-detonated; victim-activated, or timed to detonate. Car alarms, battery-powered remote doorbell devices, remote-controlled light switches, and cordless and cellular telephones are common means of detonation. Insulated wire or detonation cord is used to connect the detonator to the explosive.

IEDs can be dropped from or attached to the underside of overpasses. Drivers should watch for suspicious activity on overpasses and never stop under one. Enemy hiding positions will usually have line of sight to the IED and an easy escape route. IEDs can be emplaced along the side of the road, the shoulder, the median strip, or in numerous other areas (*Figure 14-33, Figure 14-34, and Figure 14-35*).

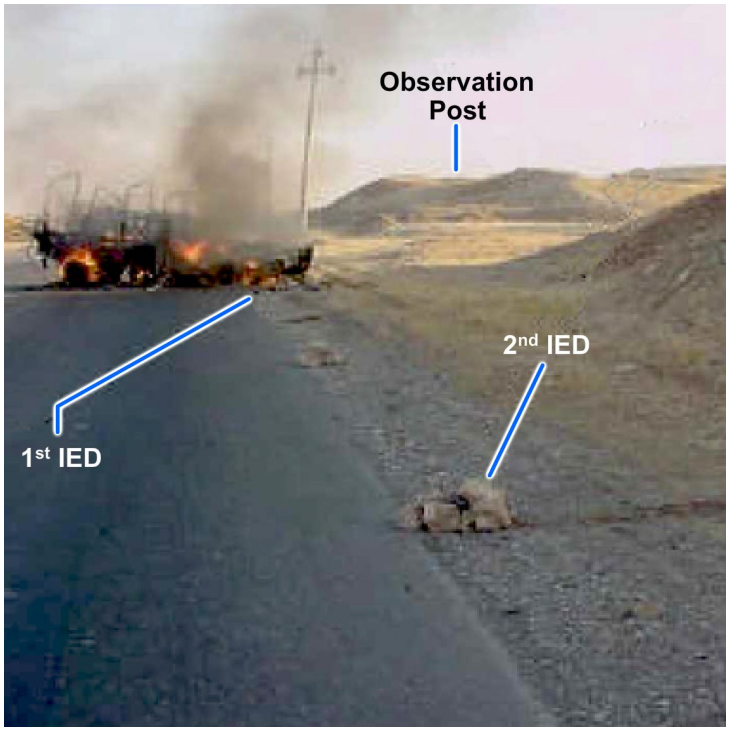


Figure 14-33 — Roadside IEDs.



Figure 14-34 — Projectile concealed by rocks on roadside.



Figure 14-35 — Modified mortar with trip wire attached to grenade fuze.

4.3.0 Reactions to a “Possible Improvised Explosive Device (IED)”

If you encounter a possible IED during military operations, you should properly establish an initial exclusion area and security, and report “Possible IED” to HHQ with 100% accuracy.

- Do not attempt to move the possible IED.
- Do not approach the possible IED.
- If possible, avoid using any communication/electronic equipment within any established exclusion area.

Upon encountering a possible IED, the following step should be followed:

1. Ensure all movements toward possible IED are stopped.
2. Establish minimum initial exclusion area of 300 meters around possible IED.
3. Establish security:
    a. Search secure area for possible secondary explosive device(s)/hazards, while maintaining security.
    b. Identify potential enemy force observation/vantage points.
    c. Seek all available man-made or natural frontal and overhead cover.
    d. Avoid establishing a “reaction” pattern.
4. Forward information to HHQ using standard 9-line UXO Report.
5. Continue mission IAW HHQ guidance.

Summary

In this chapter, you were introduced to hand grenades, land mines, flares, improvised explosive devices, and what you should do when you encounter them. This chapter described the functions of the different types of grenades, how to arm grenades, and throw them properly. The discussion pointed out how they are detonated, what to look for when identifying them, and how to proceed on patrol to protect yourself. IEDs have taken many lives over the past decade, and will continue to do so. It is imperative for you to learn how to identify them and what to do when you encounter them.

Assignment 14

Objectives

1. Identify types of hand grenades and specify their components, principles of operation, uses, and procedures for throwing and handling them safely.
2. Specify the purpose of land mines and the methods of detonating and proper disposal.
3. Specify the uses, construction features, and range of the Claymore mine.
4. Recognize the construction features of and uses for trip flares and the methods of removing them.
5. Identify improvised explosive devices and describe methods of triggering, likely places of concealment, and common material makeup.
6. Specify the methods of detecting mines and Improvised Explosive Devices (IEDs) and personal protection measures.

Questions

1. Fragmentation and chemical hand grenades are used primarily against what type of targets?

    1. Material
    2. Vehicles
    3. Structures
    4. Personnel

2. The MK1 illumination grenade provides 55,000 candlepower of light for a maximum of how many seconds?

    1. 15
    2. 25
    3. 30
    4. 40

3. When, if ever, can the safety pin of the MK1 illuminating grenade, be replaced?

    1. During the training phase of hand grenade throwing
    2. As long as the safety lever has not been released
    3. Only during combat conditions
    4. Never

4. Practice and training grenades are used for what purpose?

    1. Train personnel in sending smoke signals
    2. Expose personnel to the effects of tear gas
    3. Familiarize personnel in the care and handling of service grenades
    4. Demonstrate the power of grenades

5. The fuzes for casualty-producing hand grenades have a delay time of how many seconds?

    1. 1 to 2
    2. 2 to 3
    3. 3 to 4
    4. 4 to 5

6. A fragmentation type of hand grenade uses which, if any, of the following fuze assemblies?

    1. Ignition
    2. Impact
    3. Flammable
    4. None of the answers are correct.

7. The arming sleeve is held in place before the grenade is thrown in what type of grenade?

    1. Fragmentation
    2. Riot control
    3. Illuminating
    4. Practice

8. If a grenade armed with the impacting detonating fuze is accidentally dropped after the safety pin has been removed, what action must you take to ensure the safety of friendly personnel?

    1. Pick it up and replace the safety pin
    2. Pick it up and throw it to a safe area
    3. Leave it where it is, shout ”grenade,” and seek cover
    4. Kick it or toss it into a nearby sump or ditch

9. The safety lever of a chemical hand grenade is released as it is thrown because of what reason?

    1. There is an extremely short time-delay fuze.
    2. There is danger of the lever hitting friendly personnel.
    3. The time delay fuze is too long to do otherwise safely.
    4. The fuze may not become activated.

10. Land mines are used to inflict casualties or damage against _____.

    1. heavy equipment only
    2. enemy personnel only
    3. enemy personnel and vehicles
    4. light tanks only

11. As a Seabee, what types of mine are you authorized to use?

    1. Pull action
    2. Pressure-actuated
    3. Antivehicle
    4. Antipersonnel

12. The Claymore mine used by Seabees is detonated by what means?

    1. Pressure release
    2. Trip wire
    3. Pull or jerk
    4. Electrical control

13. What type of explosive charge is used in the Claymore mine?

    1. Dynamite
    2. TNT
    3. Composition C4
    4. Black powder

14. What type of firing device is used with the Claymore mine?

    1. Pulse generator
    2. Electric battery
    3. Trip wire
    4. Pressure fuze

15. What amount of wire is issued with the Claymore mine?

    1. 100 feet
    2. 200 feet
    3. 100 yards
    4. 200 yards

16. On a Claymore mine, in what location can complete instructions be found?

    1. Bandoleer flap
    2. Firing device
    3. Back
    4. Front

17. What is the most effective range of a Claymore mine, in meters?

    1. 10 to 20
    2. 20 to 30
    3. 30 to 40
    4. 40 to 50

18. As a Seabee, you should use trip flares for what function?

    1. Providing continuous illumination
    2. Giving warning of attack or infiltration of the enemy
    3. Illuminating large areas
    4. Signaling other units

19. The mounting bracket and trigger mechanism of the trip flare are attached to what other part?

    1. Upper cap
    2. Fuze
    3. Base cap
    4. Safety lever

20. You are changing defensive positions, and you wish to use the same trip flares in the new position. Before moving them to the new position, what should you do first?

    1. Detach the trip wires from the triggers
    2. Rotate the trigger mechanisms to their original positions
    3. Depress the safety levers and replace the safety pins
    4. Remove the fuzes from the trip flares

21. IEDs are nonstandard, and usually fabricated from _____ materials.

    1. common
    2. special
    3. radioactive
    4. adhesive

22. What reaction should be taken upon first encountering a possible IED?

    1. Continue movement around the possible IED and report the location to Higher Headquarters.
    2. Stop all movement toward the possible IED and immediately evaluate your surrounding area for possible secondary IEDs.
    3. Identify the the type and mark the location.
    4. Identify the enemy force that is in the immediate area.

23. Which of the following can be used to detonate IEDs?

    1. Insulated wire rope and battery operated bulbs.
    2. Battery-powered remote doorbell devices, and remote controlled light switches.
    3. Bridges and overpasses.
    4. Dropped from the underside of overpasses.

24. Enemy hiding positions will usually have _____ to the IED and an easy escape route.

1. safety switches
2. trip flares
3. cameras
4. line of sight

25. What minimum initial exclusion area is established when encountering a possible IED?

1. 100 meters around possible IED.
2. 300 meters around possible IED.
3. 800 meters from man-made frontal cover
4. 900 meters from man-made frontal and overhead cover

ASSIGNMENT 14

Hand Grenades, Land Mines, Pyrotechnics, and Improvised Explosive Devices

Directions: Select the correct answer from the list of alternates below each question in the end of chapter assignment. Write in the answer next to the corresponding question number below. Use this answer sheet as a reference to completing the online assignment related to this assignment.

1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	

10.	
11.	
12.	
13.	
14.	
15.	
16.	
17.	
18.	

19.	
20.	
21.	
22.	
23.	
24.	
25.	

Additional Resources and References

This chapter is intended to present thorough resources for task training. The following reference works are suggested for further study. This is optional material for continued education rather than for task training.

Grenades and Pyrotechnic Signals, Department of the Army Field Manual (FM) 3-23.30

Mine/Countermine Operations, Department of the Army, PCN 32002016000 Field Manual (FM) 20-32

Improvised Explosive Device (IED) Awareness Guide, TC 9-21-01(093-89D-01)

Trainee Feedback

Center for Seabees and Facilities Engineering (CSFE) makes every effort to keep their courses up-to-date and free of technical errors. If you have a suggestion, found an error or inaccuracy, please write, FAX or email us by using the form below. Use one form for each comment and be sure to fill in the information as accurately and detailed as possible. Thank you for your assistance.

Write: CSFE
NCF Training Division (N7B)
3502 Goodspeed St.
Port Hueneme, CA 93043-4337

FAX: (805) 982-5508 / DSN 551-5508

E-mail: CSFE_CBCH@navy.mil

Trainee Feedback Form

Course: Seabee Combat Handbook, Volume ____, NAVEDTRA: _____

Course Date: _____ Chapter Number: _____ Page: _____

Paragraph: _____ Sentence: _____ Figure: _____ Frame/View: _____

Description: _____
_____
_____
_____
_____
_____

(optional) Corrective action: _____
_____
_____

(optional) Supporting reference(s): _____
_____

Your email address, if a response is requested: _____

Trainee Feedback

Center for Seabees and Facilities Engineering (CSFE) makes every effort to keep their courses up-to-date and free of technical errors. If you have a suggestion, found an error or inaccuracy, please write, FAX or email us by using the form below. Use one form for each comment and be sure to fill in the information as accurately and detailed as possible. Thank you for your assistance.

Write: CSFE
NCF Training Division (N7B)
3502 Goodspeed St.
Port Hueneme, CA 93043-4337

FAX: (805) 982-5508 / DSN 551-5508

E-mail: CSFE_CBCH@navy.mil

Trainee Feedback Form

Course: Seabee Combat Handbook, Volume ____, NAVEDTRA: _____

Course Date: _____ Chapter Number: _____ Page: _____

Paragraph: _____ Sentence: _____ Figure: _____ Frame/View: _____

Description: _____
_____
_____
_____
_____
_____

(optional) Corrective action: _____
_____
_____

(optional) Supporting reference(s): _____
_____

Your email address, if a response is requested: _____

Appendix I

Glossary of Common Terms

ADDRESSEE – The activity or individual to whom a message is to be delivered.

ADJUST – A command to the spotter or observer to initiate an adjustment on a designated target.

ADJUSTMENT – Process used to obtain correct line, range, and correct height of burst (if time fuzes are used) in engaging a target by observed fire.

ADMINISTRATIVE PLAN OR ORDER – A combat plan or order relating to the operation plan or order for a tactical operation that is issued as its paragraph 4. It sets forth information and instructions governing the logistical and administrative support of the operation.

ADVANCE –The forward movement of a unit toward the enemy.

ADVANCED BASE – A base located in or near an operational area whose primary mission is to support military operations.

ADVANCED PARTY – A security element organic to the advance guard that precedes and protects the support.

ALIGNMENT – The formation in a straight line of several elements.

ALTERNATE COMMAND POST – Any location designated by a commander to assume command post functions in the event the command post becomes inoperative. It may be partially or fully equipped and manned, or it may be the command post of a subordinate unit.

ALTERNATE POSITION – The position designated to serve as the primary position under certain conditions.

AMMUNITION LOT – A quantity of homogeneous ammunition, identified by a unique lot number, which is manufactured, assembled, or renovated by one producer under uniform conditions and which is expected to function in a uniform manner.

AMMUNITION SUPPLY POINT – A point at which ammunition, obtained from supporting supply points by a division or other unit, are broken down for distribution to subordinate units. Distribution points usually carry no stocks; items drawn are issued completely as soon as possible.

AMPLIFIER – A device that increases signal power.

ANGLE OF ELEVATION – The vertical angle between the line from the muzzle of a weapon to the target and the axis of the bore when the weapon is laid for range.

ANNEX – A document appended to and forming a part of a complete plan, order, or other document.

ANTENNA – An electrical conductor, or system of conductors, used to transmit or receive radio waves.

APERTURE SIGHT – A lensless sight by which the target is viewed through a hole, or aperture (as contrasted with an open sight having only a V-cut notch).

AREA DEFENSE – A form of defense oriented toward the retention of specific terrain; area defense relies mainly on deployed forces that fire to stop and repulse the attacker.

AREA OF CONCENTRATION – A limited area on which a volume of fire is placed within a limited time.

AREA OF OPERATIONS – An operational area defined by the joint force commander for land and maritime forces. Areas of operation do not typically encompass the entire operational area of the joint force commander, but should be large enough for component commanders to accomplish their missions and protect their forces. Also called AO.

AREA OF RESPONSIBILITY – The geographical area associated with a combatant command within which a combatant commander has authority to plan and conduct operations. Also called AOR.

ARMING – As applied to explosives, weapons, and ammunition, the changing from a safe condition to a state of readiness for initiation.

ASSEMBLY – Two or more parts fastened together and not usually disassembled except for replacement.

ASSEMBLY AREA – The area where a command assembles, preparatory to making a move.

ATTACHED – A unit is attached to another when command, operational, and administrative control of the attached unit passes from its parent unit to the commander of the unit to which attachment is made.

ATTACK – A phase of offensive combat; offensive action directed against the enemy with the intent to kill, capture, or drive him from his position.

ATTACK POSITION – The most forward covered and concealed position in rear of the line of departure occupied by assault units for the minimum amount of time necessary to coordinate final details and preparations for the attack.

AUTHENTICATE – A challenge given by voice or electrical means to attest to the authenticity of a message or transmission.

AUTHENTICATION – (1) A security measure designed to protect a communications system against acceptance of a fraudulent transmission or simulation by establishing the validity of a transmission, message, or originator. (2) A means of identifying individuals and verifying their eligibility to receive specific categories of information. (3) Evidence by proper signature or seal that a document is genuine and official. (4) In personnel recovery missions, the process whereby the identity of an isolated person is confirmed.

AUTOMATIC – The self-powered action of a weapon, using recoil, gas, or blowback operation that produces a rapid and continuous burst of shots while the trigger is depressed.

AVENUE OF APPROACH – An air or ground route of an attacking force of a given size leading to its objective or to key terrain in its path. Also called AA.

AXIS OF THE BORE – An imaginary centerline of the bore of a gun.

AZIMUTH – Quantities may be expressed in positive quantities increasing in a clockwise direction, or in X, Y coordinates where south and west are negative. They

may be referenced to true north or magnetic north depending on the particular weapon system used.

BANDWIDTH – The difference between the limiting frequencies of a continuous frequency band expressed in hertz (cycles per second). The term bandwidth is also loosely used to refer to the rate at which data can be transmitted over a given communications circuit. In the latter usage, bandwidth is usually expressed in either kilobits per second or megabits per second.

BARREL – A metal tube used to direct the bullet in its line of flight.

BARRIER – A coordinated series of obstacles designed or employed to channel, direct, restrict, delay, or stop the movement of an opposing force and to impose additional losses in personnel, time, and equipment on the opposing force. Barriers can exist naturally, be man-made, or a combination of both.

BASE (BASE UNIT) – The element or unit in a tactical operation around which a movement or maneuver is planned and performed.

BASE OF FIRE – One or more units that give supporting fire to an attacking unit and serve as the base around which attack operations are carried out.

BATTALION FORWARD DEFENSE AREA – Portion of a battle area defended by front-line companies; it extends to the limit of the rearward extension of lateral boundaries of the front-line companies.

BATTERY – The position of a weapon when cocked and its recoiling parts are forwarded.

BATTLE AREA – The area in which the forward forces and their reserves are located; it is described by coordinating points, flank boundaries, and sometimes a rear boundary.

BEACHHEAD – A designated area on a hostile shore or territory which, when seized and held, ensures the continuous landing of troops and material, and provides maneuvering space for subsequent projected operations into enemy territory; the physical objective of an amphibious or airborne operation.

BEARING – The horizontal angle at a given point measured clockwise from a specific datum point to a second point.

BEATEN ZONE – The area on the ground upon which the cone of fire falls.

BIOLOGICAL AGENT – A microorganism that causes disease in personnel, plants, or animals or causes the deterioration of materiel.

BLISTER AGENT – A chemical agent which injures the eyes and lungs, and burns or blisters the skin. Also called vesicant agent.

BLOOD AGENT – A chemical compound, including the cyanide group, that affects bodily functions by preventing the normal utilization of oxygen by body tissues.

BLOWBACK – (1) Escape, to the rear and under pressure, of gases formed during the firing of a weapon. Blowback may be caused by a defective breech mechanism, a ruptured cartridge case, or a faulty primer. (2) Type of weapon operation in which the force of expanding gases acting to the rear against the face of the bolt furnishes all the energy required to initiate the complete cycle of operation. A weapon which employs this method of operation is characterized by the absence of any breech-lock or bolt-lock mechanism.

BOLT – A mechanical device for blocking the breech and holding the cartridge in the chamber during firing to prevent rearward escape of gases.

BORE SIGHTING – A process by which the axis of a gun bore and the line of a gun sight, are made parallel or are made to converge on a point.

BOUNDARIES – The battalion and company defense areas that are limited because of terrain features and avenues of approach. Company boundaries immediately forward of the Forward Line of Troops (FLOT) assign responsibility for an avenue of approach to a company, preferably the company most threatened by the avenue. Boundaries between companies extend forward of the FLOT, but stop short of the Combat Outpost Line (COPL). They extend to the rear far enough to provide sufficient area for the companies to organize their defense in depth.

BREECH – The rear end of the barrel.

BREECHBLOCK or BREECH MECHANISM – The metal block used to seal the rear end of the bore against the force of the charge; in small arms, the breech mechanism is the bolt.

BRIDGEHEAD – An area of ground taken and held in enemy territory.

BUDDY-AID – Acute medical care (first aid) provided by a non-medical service member to another person.

BULLET – The projectile of a small-arms cartridge that is discharged from a weapon toward a target.

BURST OF FIRE – A number of shots fired automatically with a single squeeze of the trigger.

BURSTING CHARGE – The force of an explosive that breaks the casing of a projectile to produce a demolition, fragmentation, or chemical action.

CACHE – A source of subsistence and supplies, typically containing items such as food, water, medical items, and/or communications equipment, packaged to prevent damage from exposure and hidden in isolated locations by such methods as burial, concealment, and/or submersion, to support isolated personnel.

CADENCE – A rhythmic rate of march at uniform step.

CALIBER – The diameter of the bore measured from land to land; usually expressed in decimal fractions of an inch.

CALL SIGN – Any combination of characters or pronounceable words, which identifies a communication facility, a command, an authority, an activity, or a unit; used primarily for establishing and maintaining communications. Also called CS.

CAM – An inclined surface that imparts a desired motion to a sliding piece. (This is a generalized small-arms definition.)

CANNIBALIZATION – The act of taking a part or parts from an unserviceable piece of equipment to make another piece of equipment serviceable.

CARTRIDGE – A small-arms round ready for firing; its components are the cartridge case, primer, propellant, and bullet.

CARTRIDGE CASE – A metal case that houses the primer and propellant and holds the bullet.

CASUALTY – Any person who is lost to the organization by having been declared dead, duty status – whereabouts unknown, missing, ill, or injured.

CASUALTY CATEGORY – A term used to specifically classify a casualty for reporting purposes based upon the casualty type and the casualty status. Casualty categories include killed in action, died of wounds received in action, and wounded in action.

CASUALTY EVACUATION – The unregulated movement of casualties that can include movement both to and between medical treatment facilities. Also called CASEVAC.

CASUALTY STATUS – A term used to classify a casualty for reporting purposes. There are seven casualty statuses: (1) deceased; (2) duty status - whereabouts unknown; (3) missing; (4) very seriously ill or injured; (5) seriously ill or injured; (6) incapacitating illness or injury; and (7) not seriously injured.

CHAIN OF COMMAND – The succession of commanding officers from a superior to a subordinate through which command is exercised.

CHAMBER – The enlarged part of the bore at the breech of a weapon that holds the cartridge.

CHAMBERING – The process of placing a round into the chamber of a weapon after it has been fed into the weapon.

CHANNEL – An electrical path over which transmissions can be made from one station (unit) to another.

CHARGE – A part of the fire command that established the amount of propellant to be used with a shell.

CHECK POINT – (1) A predetermined point on the surface of the Earth used as a means of controlling movement, a registration target for fire adjustment, or reference for location. (2) Center of impact; a burst center. (3) Geographical location on land or water above which the position of an aircraft in flight may be determined by observation or by electrical means. (4) A place where military police check vehicular or pedestrian traffic in order to enforce circulation control measures and other laws, orders, and regulations.

CHEMICAL AGENT – Any toxic chemical intended for use in military operations.

CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR DEFENSE – Efforts to protect personnel on military installations and facilities from chemical, biological, radiological, and nuclear incidents. Also called CBRN defense.

CHEMICAL DOSE – The amount of chemical agent, expressed in milligrams, that is taken or absorbed by the body.

CHEMICAL MONITORING – The continued or periodic process of determining whether or not a chemical agent is present.

CHEMICAL SURVEY – The directed effort to determine the nature and degree of chemical hazard in an area and to delineate the perimeter of the hazard area.

CHEMICAL WARFARE – All aspects of military operations involving the employment of lethal and incapacitating munitions/agents and the warning and protective measures associated with such offensive operations. Since riot control agents and herbicides are not considered to be chemical warfare agents, those two items will be referred to separately or under the broader term “chemical,” which will be used to include all types of chemical munitions/agents collectively. Also called CW.

CHEMICAL WEAPON – Together or separately, (1) a toxic chemical and its precursors, except when intended for a purpose not prohibited under the Chemical Weapons Convention; (2) a munition or device, specifically designed to cause death or other

harm through toxic properties of those chemicals specified in (1) above, which would be released as a result of the employment of such munition or device; (3) any equipment specifically designed for use directly in connection with the employment of munitions or devices specified in (2) above.

CHLORINATION – Treatment of water with the addition of chlorine either as a gas or liquid, or in the form of hypochlorite, usually for the purpose of disinfection, oxidation, etc.

CIRCUIT – A communications link between two or more points.

CIVIC ACTION – The use of military forces on projects that contribute to the economic development of the local population. The projects concern education, training, public works, agriculture, transportation, communications, health, sanitation, and others.

CLEAR – (1) To approve or authorize, or to obtain approval or authorization for: a. a person or persons with regard to their actions, movements, duties, etc.; b. an object or group of objects, as equipment or supplies, with regard to quality, quantity, purpose, movement, disposition, etc.; and c. a request, with regard to correctness of form, validity, etc. (2) To give one or more aircraft a clearance. (3) To give a person a security clearance. (4) To fly over an obstacle without touching it. (5) To pass a designated point, line, or object. The end of a column must pass the designated feature before the latter is cleared. (6) a. To operate a gun so as to unload it or make certain no ammunition remains; and b. to free a gun of stoppages. (7) To clear an engine; to open the throttle of an idling engine to free it from carbon. (8) To clear the air to gain either temporary or permanent air superiority or control in a given sector.

CLIP – A device that holds cartridges so they can be loaded into a weapon.

CLOSE AIR SUPPORT – Air action by fixed- and rotary-wing aircraft against hostile targets that are in close proximity to friendly forces and that require detailed integration of each air mission with the fire and movement of those forces. Also called CAS.

CLOSE COMBAT – Hand-to-hand fighting with weapons, such as bayonets, hand grenades, service rifles, or pistols.

COCKING – The phase of operation that pertains to the locking of the hammer or firing assembly, slide assembly, or bolt group of a weapon in a fixed (or held) position under spring tension and with all parts in position.

COLUMN – A formation in which the elements are placed one behind the other; a section or platoon is in column when its squads are in column and abreast.

COMBAT ORDER – An order issued by a commander for a combat operation specifying time and date of execution.

COMBAT OUTPOST – A security element for a battalion defensive position located approximately 915 to 2,300 meters forward of the main line of resistance; its primary purpose is to engage the enemy.

COMBAT PATROL – A patrol whose primary mission is to engage actively in combat with the enemy and whose secondary mission is to gain information about the enemy and the terrain.

COMBAT PLAN – A plan issued for a combat operation that may be effective immediately for planning purposes or for specified preparatory action. It is not put into execution until directed by the commander in a separate order of execution or

until certain specified conditions are determined to exist. When its execution is directed, a combat plan becomes, in effect, a combat order.

COMBAT SERVICE SUPPORT – The essential capabilities, functions, activities, and tasks necessary to sustain all elements of operating forces in theater at all levels of war. Within the national and theater logistic systems, it includes but is not limited to that support rendered by service forces in ensuring the aspects of supply, maintenance, transportation, health services, and other services required by aviation and ground combat troops to permit those units to accomplish their missions in combat. Combat service support encompasses those activities at all levels of war that produce sustainment to all operating forces on the battlefield. Also called CSS.

COMBAT SERVICE SUPPORT ELEMENT – The core element of a Marine Air-Ground Task Force (MAGTF) that is task-organized to provide the combat service support necessary to accomplish the MAGTF mission. The combat service support element varies in size from a small detachment to one or more force service support groups. It provides supply, maintenance, transportation, general engineering, health services, and a variety of other services to the MAGTF. The combat service support element itself is not a formal command. Also called CSSE.

COMMAND AND CONTROL – The exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission. Command and control functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures employed by a commander in planning, directing, coordinating, and controlling forces and operations in the accomplishment of the mission. Also called C2.

COMMAND ELEMENT – The core element of a Marine air-ground task force that is the headquarters. The command element is composed of the commander, general or executive and special staff sections, headquarters section, and requisite communications support, intelligence, and reconnaissance forces necessary to accomplish the mission. The command element provides command and control, intelligence, and other support essential for effective planning and execution of operations by the other elements of the Marine air-ground task force. The command element varies in size and composition. Also called CE.

COMMAND POST – The location of a unit's headquarters from which the commander and the staff operate. Also called CP.

COMMUNICATIONS CENTER – An agency that is responsible for the receipt, transmission, and delivery of messages.

COMMUNICATIONS NETWORK – A system consisting of a number of designated stations connected with one another by any means of communications.

COMMUNICATIONS SECURITY – The protection resulting from all measures designed to deny unauthorized persons information of value that might be derived from the possession and study of telecommunications, or to mislead unauthorized persons in their interpretation of the results of such possession and study. Also called COMSEC.

CONCEALMENT – The protection from observation only.

CONCEPT OF FIRES – A verbal or graphic statement that clearly and concisely expresses how lethal and nonlethal fires will be synchronized and integrated to support the commander's operational objectives.

CONTAMINATION – (1) The deposit, absorption, or adsorption of radioactive material, or of biological or chemical agents on or by structures, areas, personnel, or objects. (2) Food and/or water made unfit for consumption by humans or animals because of the presence of environmental chemicals, radioactive elements, bacteria or organisms, the byproduct of the growth of bacteria or organisms, the decomposing material (to include the food substance itself), or waste in the food or water.

CONTAMINATION AVOIDANCE – Individual and/or unit measures taken to reduce the effects of chemical, biological, radiological, and nuclear hazards.

CONTINGENCY – A situation requiring military operations in response to natural disasters, terrorists, subversives, or as otherwise directed by appropriate authority to protect U.S. interests.

CONTINGENCY OPERATION – A military operation that is either designated by the Secretary of Defense as a contingency operation or becomes a contingency operation as a matter of law (Title 10, United States Code, Section 101[a][13]). It is a military operation that: a. is designated by the Secretary of Defense as an operation in which members of the Armed Forces are or may become involved in military actions, operations, or hostilities against an enemy of the United States or against an opposing force; or b. is created by definition of law. Under Title 10, United States Code, Section 101 (a)(13)(B), a contingency operation exists if a military operation results in the (1) call-up to (or retention on) active duty of members of the uniformed services under certain enumerated statutes (Title 10, United States Code, Sections 688, 12301[a], 12302, 12304, 12305, 12406, or 331-335); and (2) the call-up to (or retention on) active duty of members of the uniformed services under other (non-enumerated) statutes during war or national emergency declared by the President or Congress.

CONTROL – (1) Authority that may be less than full command exercised by a commander over part of the activities of subordinate or other organizations. (2) In mapping, charting, and photogrammetry, a collective term for a system of marks or objects on the Earth or on a map or a photograph, whose positions or elevations (or both) have been or will be determined. (3) Physical or psychological pressures exerted with the intent to assure that an agent or group will respond as directed. (4) An indicator governing the distribution and use of documents, information, or material. Such indicators are the subject of intelligence community agreement and are specifically defined in appropriate regulations.

CONVOY – (1) A number of merchant ships and/or naval auxiliaries usually escorted by warships and/or aircraft—or a single merchant ship or naval auxiliary under surface escort—assembled and organized for the purpose of passage together. (2) A group of vehicles organized for the purpose of control and orderly movement with or without escort protection that moves over the same route at the same time and under one commander.

COORDINATES – Linear or angular quantities which designate the position that a point occupies in a given reference frame or system. Also used as a general term to designate the particular kind of reference frame or system such as plane rectangular coordinates or spherical coordinates.

COORDINATING POINT – Designated point at which, in all types of combat, adjacent units/formations must make contact for purposes of control and coordination.

COOK OFF – A cook off is a functioning of any or all of the explosive components of a cartridge or shell caused by a weapon that has become very hot from continuous firing.

COUNTERATTACK – An attack by part or all of a defending force against an enemy attacking force. The specific purpose of the attack is to regain ground lost or to cut off or destroy enemy advance units. The general objective of the attack is to deny friendly territory to the enemy.

COUNTER RECOIL – The return of a breech mechanism to battery position after it has reached recoil limit. In small-arms weapons, it is usually accomplished by the release of compressed springs.

COVERING FIRE – (1) Fire used to protect troops when they are within range of enemy small arms. (2) In amphibious usage, fire delivered prior to the landing to cover preparatory operations such as underwater demolition or mine countermeasures.

COVER – Any object that gives protection from enemy fire.

CRITICAL TERRAIN – The possession of which is vital to the accomplishment of the mission.

CRYSTAL – A natural substance, such as quartz or tourmaline that is used to control the frequency of radio transmitters.

CYCLIC RATE OF FIRE – The theoretical number of rounds a weapon can fire in one minute, disregarding the limits of overheating and the capacity of the magazine.

CYLINDER – The chamber in which the piston moves in gas-operated weapons.

DATE-TIME GROUP – The date and time that identifies when a message is prepared for transmission. The date-time group is expressed in six digits followed by a zone suffix; the first pair of digits denotes the date; the second pair the hours; and the third pair the minutes. Also called DTG.

D-DAY – The day on which an operation commences or is to commence.

DEAD SPACE – The area within the maximum range of a weapon that cannot be covered by fire from a particular position because of intervening obstacles or because of the nature of the ground.

DEBARKATION – The unloading of troops, equipment, or supplies from a ship or aircraft.

DECONTAMINATION – The process of making any person, object, or area safe by absorbing, destroying, neutralizing, making harmless, or removing chemical or biological agents, or by removing radioactive material clinging to or around it.

DECONTAMINATION STATION – A building or location suitably equipped and organized where personnel and materiel are cleansed of chemical, biological, or radiological contaminants.

DEFENSE IN DEPTH – The siting of mutually supporting defense positions designed to absorb and progressively weaken attack, prevent initial observations of the whole position by the enemy, and to allow the commander to maneuver the reserve.

DEFENSIVE POSITION – A portion of a defense area physically occupied by troops and weapons.

DEFILADE – (1) Protection from hostile observation and fire provided by an obstacle such as a hill, ridge, or bank. (2) A vertical distance by which a position is concealed

from enemy observation. (3) To shield from enemy fire or observation by using natural or artificial obstacles.

DEFILE – A narrow place or space, such as a mountain pass, a ford, or a bridge, that restricts the advance of a force on a wide front or its movement to the sides.

DEFLECTIONS – The setting on the scale of a gun sight to place the line of fire in the direction desired; the horizontal clockwise angle between the axis of the bore and the line of sighting.

DELAYING ACTION – A form of defensive action used to slow up the enemy's advance (without becoming decisively engaged) to gain time.

DEPLOYMENT – (1) In naval usage, the change from a cruising approach or contact disposition to a disposition for battle. (2) The movement of forces within operational areas. (3) The positioning of forces into a formation for battle. (4) The relocation of forces and materiel to desired operational areas. Deployment encompasses all activities from origin or home station through destination, specifically including intra-continental United States, intertheater, and intratheater movement legs, staging, and holding areas.

DEPTH – The distance from front to rear of an element, formation, or position.

DETAINEE – A term used to refer to any person captured or otherwise detained by an armed force.

DIRECT FIRE – Fire delivered by a weapon sighted directly at the target.

DIRECT SUPPORT – The support given directly to a specific force in response to its request for assistance.

DISPERSION – The spreading of troops and materiel over a wide area to avoid offering the enemy a concentrated target; a scattered pattern of hits of bombs dropped under identical conditions or of shots fired from the same gun with the same firing data.

DISPLACEMENT – The movement of supporting weapons or elements from one position to another.

DISTANCE – Space between elements in the direction of depth. Between individuals, it is the space between your chest and the person to your front.

DOCTRINE – Fundamental principles by which the military forces or elements thereof guide their actions in support of national objectives. It is authoritative but requires judgment in application.

DOUBLE ACTION – An action of depressing the trigger that cocks the hammer and then releases it to fire a weapon. Both occur on one pull of the trigger.

DOUBLE TIME – Cadence at 180 steps (36 inches in length) per minute.

DUMP – An area used for the temporary storage and disbursing of military supplies.

ECHELON – (1) A subdivision of a headquarters, such as forward echelon or rear echelon; a separate level of command. (2) A fraction of a command in the direction of depth to which a principal combat mission is assigned, such as attack echelon, support echelon, or reserve echelon. (3) A formation in which the elements are placed one behind another, extending beyond and unmasking one another wholly or in part.

EJECTION – The process of expelling the empty cartridge case from a weapon through the use of an ejector.

EJECTOR – The part that expels the empty cartridge case from the receiver of a weapon; it may be fixed, spring-loaded, or movable.

ELEMENT – An individual squad, section, platoon, company, or another unit that is part of a larger unit.

EMBARKATION – The loading of troops, equipment, or supplies into a ship or aircraft.

EMERGENCY OPERATIONS CENTER – The physical location at which the coordination of information and resources to support domestic incident management activities normally takes place. An emergency operations center may be a temporary facility or may be located in a more central or permanently established facility, perhaps at a higher level of organization within a jurisdiction. Emergency operations centers may be organized by major functional disciplines (e.g., fire, law enforcement, and medical services), by jurisdiction (e.g., Federal, state, regional, county, city, tribal), or by some combination thereof. Also called EOC.

EMPLACEMENT – A prepared position from which a weapon executes its fire mission.

ENFILADE FIRE – Fire delivered so the long axis of the beaten zone coincides with the long axis of the target.

ENVELOPMENT – An attack made on one or both of the enemy's flanks or rear; usually accompanied by an attack on his front.

EROSION – The wearing away of the inner surface of a gun barrel as a result of mechanical wear and the chemical action of powder gases.

EVACUATION – The process of moving casualties from a battlefield and subsequently moving them along the chain of evacuation, as necessary; the clearance of personnel or material, or both, from a given locality.

EVASION AND ESCAPE – The procedures and operations whereby military personnel and other selected individuals are enabled to emerge from an enemy-held or hostile area to areas under friendly control. Also called E&E.

EXPEDITIONARY FORCE – An armed force organized to accomplish a specific objective in a foreign country.

EXPLOITATION – The last phase of offensive combat that follows the reorganization of the attacking unit on the objective. In this phase of combat, the attacking unit may be directed to continue the attack, to pursue the enemy, or to mop up.

EXPLOSIVE ORDNANCE DISPOSAL – The detection, identification, on-site evaluation, rendering safe, recovery, and final disposal of unexploded explosive ordnance. It may also include explosive ordnance which has become hazardous by damage or deterioration. Also called EOD.

EXTRACTION – The phase of operation that deals with the removal of a weapon's empty cartridge case from the chamber of an extracting device before ejection.

EXTRACTOR – The part that withdraws the empty cartridge case from the chamber of a weapon.

FEEDING – The mechanical positioning of an individual round for subsequent insertion into the chamber of a weapon during the cycle or operation.

FIELD FORTIFICATION – Entrenchments, emplacements, and obstacles constructed in the field to increase the natural defensive strength of the terrain.

FIELD OF FIRE – The area that a weapon or group of weapons covers effectively with fire.

FIELD STRIPPING – Removal of the groups from a weapon; does not include disassembly of groups.

FILE – A single column of men or vehicles, one behind the other.

FINAL PROTECTIVE FIRE – An immediately available prearranged barrier of fire designed to impede enemy movement across defensive lines or areas.

FINAL PROTECTIVE LINE – A line along which interlocking bands of grazing fire are placed to stop enemy assaults. The line is placed at a predetermined distance from all available weapons fixed in direction and elevation that are capable of delivery under conditions of visibility.

FIRE AND MANEUVER – The close coordination of the movement of a unit with its own fire or the fire of supporting weapons. This coordination enables a portion of the unit to move forward, while the remaining portion covers the forward movement by fire.

FIRE CONTROL – All operations connected with the preparation and application of fire to a target.

FIRE DIRECTION CENTER – The element of a command post, consisting of gunnery and communication personnel and equipment, by means of which the commander exercises fire direction and fire control.

FIRE MISSION – A target assigned to a unit or personnel manning a certain weapon or weapons with instructions as to the time and method of firing and placing fire on the target.

FIRE UNIT – A unit whose fire is under the immediate and effective control of one leader.

FIRING MECHANISM – The parts of a weapon that move together to cause the cartridge primer to be struck when the trigger is depressed.

FIRING POSITIONS – Defensive positions from which fire missions are carried out; they are designated primary, alternate, or supplemental.

FIXED FIRE – Fire delivered on a point target.

FLANK – (1) The right or left extremity of a unit. (2) The element on the extreme right or left of the line. (3) A direction at right angles to the direction a unit is facing.

FLANK GUARD – A security detachment that protects the flank of a body of troops on the march.

FLANKING FIRE – Fire delivered at right angles to the enemy flank.

FLAT TRAJECTORY – A trajectory having little or no curvature.

FORCE MULTIPLIER – A capability that, when added to and employed by a combat force, significantly increases the combat potential of that force and thus enhances the probability of successful mission accomplishment.

FORCE PROTECTION – Preventive measures taken to mitigate hostile actions against Department of Defense personnel (to include family members), resources, facilities, and critical information. Force protection does not include actions to defeat the enemy or protect against accidents, weather, or disease. Also called FP.

FORCE PROTECTION CONDITION – A Chairman of the Joint Chiefs of Staff-approved standard for identification of and recommended responses to terrorist threats against U.S. personnel and facilities. Also called FPCON.

FORMATION – Arrangement of the elements of a unit in line, in column, or in any other prescribed manner.

FORWARD AREA – An area in proximity to combat.

FORWARD EDGE OF THE BATTLE AREA – The foremost limits of a series of areas in which ground combat units are deployed, excluding the areas in which the covering or screening forces are operating, designated to coordinate fire support, the positioning of forces, or the maneuver of units. Also called FEBA.

FORWARD LINE OF TROOPS – A line that indicates the most forward positions of friendly forces in any kind of military operation at a specific time. The forward line of own troops normally identifies the forward location of covering and screening forces. The forward line of own troops may be at, beyond, or short of the forward edge of the battle area. An enemy forward line of own troops indicates the forward-most position of hostile forces. Also called FLOT.

FORWARD OPERATING BASE – An airfield used to support tactical operations without establishing full support facilities. The base may be used for an extended time period. Support by a main operating base will be required to provide backup support for a forward operating base. Also called FOB.

FRAGMENTARY ORDER – An abbreviated form of an operation order issued as needed after an operation order to change or modify that order or to execute a branch or sequel to that order. Also called FRAGORD or FRAGO.

FREQUENCY – The band on which a unit is to operate its radio communications.

FRONT – (1) The line of contact of two opposing forces. (2) The length of space of an element or formation measured from one flank to the other. (3) The direction of the enemy.

FRONTAL FIRE – Fire delivered perpendicular to the enemy (across his front).

FUZE – A device for setting off an explosive charge.

GAS-OPERATED – The small-arms principle by which gas pressure from a fired cartridge activates the operating parts of a weapon using a piston and cylinder arrangement.

GAS PORT – A small hole drilled in the barrel to allow the expanding gases to strike the piston in the cylinder of a gas-operated weapon; sometimes called a vent.

GENERAL SUPPORT – The support given to a force as a whole and not to any particular subdivision thereof.

GLOBAL POSITIONING SYSTEM – A satellite-based radio navigation system operated by the Department of Defense to provide all military, civil, and commercial users with precise positioning, navigation, and timing. Also called GPS.

GO NO-GO – The condition or state of operability of a component or system: “go,” functioning properly; or “no-go,” not functioning properly. Alternatively, a critical point at which a decision to proceed or not must be made.

GRAZING FIRE – Fire from a weapon in which the trajectory does not rise higher than the height of a man standing.

GRENADE SUMP – A circular hole large enough to accept the largest known enemy grenade; it slopes downward under the fire step in the fighting hole. Hand grenades thrown into the fighting hole are exploded in this sump; their fragmentation is restricted to the unoccupied end of the fighting hole.

GRID – (1) Two sets of parallel lines intersecting at right angles and forming squares; the grid is superimposed on maps, charts, and other similar representations of the Earth's surface in an accurate and consistent manner in order to permit identification of ground locations with respect to other locations and the computation of direction and distance to other points. (2) A term used in giving the location of a geographic point by grid coordinates.

GRID COORDINATES – Coordinates of a grid coordinate system to which numbers and letters are assigned for use in designating a point on a gridded map, photograph, or chart.

GROOVES – The depressed areas between the lands (raised surfaces) in the bore; the cutaway portion of the rifling into which the jacket or rotating band of a bullet fits to impart rotation to the bullet in its line of flight.

GROUND ZERO – The point on the ground or directly above at which a nuclear weapon has exploded.

GROUP – Two or more parts or assemblies that either function together in a gun or are so closely related to one another that they should be considered as a unit.

HAMMER – A lever that is swung around by spring pressure to strike the firing pin of a weapon.

HANG FIRE – A delay in the functioning of a propelling charge explosive train at the time of firing. In most cases the delay, though unpredictable, ranges from a split second to several minutes.

HEAD – The leading element of a column.

HEADSPACE – In small-arms weapons, the distance between the face of the bolt and the base of the cartridge when it is fully chambered and the bolt is locked.

HELICOPTER LANDING ZONE – A specified ground area for landing assault helicopters to embark or disembark troops and/or cargo. A landing zone may contain one or more landing sites. Also called HLZ.

HOST NATION – A nation which receives the forces and/or supplies of allied nations and/or NATO organizations to be located on, to operate in, or to transit through its territory. Also called HN.

HOST-NATION SUPPORT – Civil and/or military assistance rendered by a nation to foreign forces within its territory during peacetime, crises or emergencies, or war based on agreements mutually concluded between nations. Also called HNS.

H-HOUR – The hour an attack is to be launched, an assault wave is to land, or a movement is to begin.

IMMEDIATE DECONTAMINATION – Decontamination carried out by individuals immediately upon becoming contaminated to save lives, minimize casualties, and limit the spread of contamination. This may include decontamination of some personal clothing and/or equipment. Also called emergency decontamination.

IMMEDIATE MESSAGE – A category of precedence reserved for messages relating to situations that gravely affect the security of national and multinational forces or populace and that requires immediate delivery to the addressee(s).

IMPROVISED EXPLOSIVE DEVICE – A device placed or fabricated in an improvised manner incorporating destructive, lethal, noxious, pyrotechnic, or incendiary chemicals and designed to destroy, incapacitate, harass, or distract. It may incorporate military stores, but is normally devised from nonmilitary components. Also called an IED.

INDIRECT FIRE – Fire delivered at a target that cannot be seen from the gun position.

INDIVIDUAL PROTECTIVE EQUIPMENT – In chemical, biological, radiological, or nuclear operations, the personal clothing and equipment required to protect an individual from chemical, biological, and radiological hazards and some nuclear hazards. Also called IPE.

INFILTRATE – To pass troops in relatively small numbers through an opening in the enemy's position or his field of fire or through territory occupied by other troops or organizations.

INITIAL POINT – A place at which various subdivisions of a command are required to arrive at the proper time to join a marching column.

INSURGENCY – Subversive political activity, civil rebellion, revolt, or insurrection designed to weaken and overthrow a duly constituted authority by its own people.

INSURRECTION – A rising up against an established authority by its own people.

INTERFERENCE – Natural or man-made radiation of electrical energy that causes difficulty in reception of radio signals.

INTERVAL – The lateral space between elements on the same line.

IRREGULAR FORCES – Armed individuals or groups who are not members of the regular armed forces, police, or other internal security forces.

ISOLATED PERSONNEL REPORT – A Department of Defense Form (DD 1833) containing information designed to facilitate the identification and authentication of an isolated person by a recovery force. Also called ISOPREP.

JAMMING – Deliberate interference intended to prevent reception of radio signals in a specific frequency band.

KEY TERRAIN – The possession of which could prove decisive in combat.

LANDING ZONE – Any specified zone used for the landing of aircraft. Also called LZ.

LAW OF WAR – That part of international law that regulates the conduct of armed hostilities. Also called the law of armed conflict.

LEACH FIELD – Also known as a drainage field, is a network of perforated pipes that are laid in underground gravel-filled trenches to dissipate the effluent from a water-based collection and storage/treatment or (semi-) centralized treatment technology.

LEAF SIGHT – A type of metallic sight in which the aperture is raised to operating position by being swung upward on a hinged leaf.

LIMITING POINT – The point along a line of resistance where the responsibility of one unit stops and that of another begins. Limiting points are placed on the boundaries between companies to indicate specific localities on the ground where the battalion command wishes the company commanders to coordinate their defense.

LINE – A formation in which the elements are abreast, except that a section or platoon is in line one behind the other when its squads are in line.

LINE OF DEPARTURE – A line designated to coordinate the departure of attack elements.

LISTENING POST – A one- or two-man post located forward of the battle position for the purpose of listening for enemy activity.

LOADING – (1) The manual procedure of inserting a magazine, clip, belt, or single round into a weapon or its feeding mechanism and the subsequent action for feeding, chambering, or cocking. (2) The physical placing of personnel, equipment, or supplies aboard their carriers.

LOCAL SECURITY – A security element, independent of any outpost, established by a commander to protect his unit against surprise and to ensure its readiness for action.

LOT – Specifically, a quantity of materiel all of which was manufactured under identical conditions and assigned an identifying lot number.

MACHINE GUN – An automatic, rapid-fire weapon that is fired from a mount.

MAGAZINE – A device that stores and supplies ammunition and feeds the ammunition by means of its own spring and follower.

MAIN ATTACK – The part of an attack where the commander concentrates the greater portion of offensive power.

MAIN LINE OF RESISTANCE – An imaginary line along the forward edge of the battle position designed to coordinate the fires of all units and supporting weapons.

MALFUNCTION – The failure of a weapon to function satisfactorily.

MARK – Call for fire on a specified location to orient the spotter or observer or to indicate targets.

MASK – A natural or artificial obstruction that gives shelter from or interferes with observation or fire.

MAXIMUM EFFECTIVE RANGE – The maximum distance at which a weapon may be expected to be accurate and achieve the desired effect.

MEANS OF SIGNAL COMMUNICATION – The means by which a message is conveyed from one person or place to another.

MESSAGE – Any thought or idea expressed in brief form or in plain or secret language; prepared in a form suitable for transmission by any means of communication.

MISSION – The specific task or duty assigned to an individual, weapon, or unit.

MISSION-ORIENTATED PROTECTIVE POSTURE – A flexible system of protection against chemical, biological, radiological, and nuclear contamination. This posture requires personnel to wear only that protective clothing and equipment (mission-oriented protective posture gear) appropriate to the threat level, work rate imposed by the mission, temperature, and humidity. Also called MOPP.

MOUNT – The stand on which a weapon is secured to hold it in position for rapid fire. A mount is either fixed (immovable) or flexible (movable). A flexible mount permits the weapon to move in azimuth and elevation.

MUZZLE – The front or forward end of the barrel; also called the mouth of the barrel.

MUZZLE VELOCITY – The speed at which a bullet travels when it leaves the muzzle of the barrel.

NAVAL LANDING PARTY – A force of naval personnel organized from a ship's complement for the conduct of ground-force operations ashore.

NERVE AGENT – A potentially lethal chemical agent which interferes with the transmission of nerve impulses.

NONPERSISTANT AGENT – A chemical agent that when released dissipates and/or loses its ability to cause casualties after 10 to 15 minutes.

OBJECTIVE – (1) The clearly defined, decisive, and attainable goal toward which every operation is directed. (2) The specific target of the action taken (for example, a definite terrain feature, the seizure or holding of which is essential to the commander's plan, or, an enemy force or capability without regard to terrain features).

OBLIQUE FIRE – Fire delivered from a direction that is diagonal to the long axis of the target; or fire delivered on an enemy from a direction that is between his front and flank.

OBSERVATION POST – A vantage point from which enemy activity in front of the FLOT is observed. Also called OP.

OBSTACLE – Any barrier—natural or artificial—that stops or impedes the movement of a unit.

OPERATION PLAN OR ORDER – A combat plan or order dealing with tactical operations and setting forth the mission of the unit; it deals with the commander's decision, plan of action, and such details as to the method of execution as will ensure coordinated action by the whole command. Also called OPLAN and OPORD.

OPTICAL SIGHT – A sight having lenses as contrasted with one having an aperture or open sight.

ORGANIC – Assigned to and forming an essential part of a military organization.

ORIGINATOR – The command by whose authority a message is sent.

OUTGUARD – The principal security element of a combat outpost.

OUTPOST – A stationary body of troops placed at some distance from the main body while at a halt or in a defensive position. These troops protect the main body from surprise, observation, or annoyance by enemy ground forces.

OUTPOST LINE OF RESISTANCE – A line passing through the forward edge of the outpost positions and designed to coordinate the fires of the elements of the outpost and its supporting fires.

OVERHEAD FIRE – Fire delivered over the heads of friendly troops.

OVERLAY – A transparent or translucent medium upon which special military information has been plotted at the same scale of a map, photograph, or other graphic.

PACE – The length of a full step in quick time; 30 inches.

PATROL – A detachment sent out by a larger unit for the purpose of gathering information or carrying out a destructive, harassing, mop-up, or security mission.

PERSISTENCY – In biological or chemical warfare, the characteristic of an agent which pertains to the duration of its effectiveness under determined conditions after its dispersal.

PERSISTENT AGENT – A chemical agent that, when released, remains able to cause casualties for more than 24 hours to several days or weeks.

PERSONAL PROTECTIVE EQUIPMENT – The equipment provided to shield or isolate a person from the chemical, physical, and thermal hazards that can be encountered at a hazardous materials incident. Personal protective equipment includes both personal protective clothing and respiratory protection. Also called PPE.

PENETRATION – An attack that puts the main attacking force through the enemy's principal defensive position.

PHASE LINE – A line utilized for control and coordination of military operations, usually an easily identified feature in the operational area.

PLUNGING FIRE – Fire that strikes the ground at a sharp angle.

POINT – The security element that forms the leading element of an advance guard or the rear element of an advance guard or the rear element of the rear guard.

POINT OF DEPARTURE – The point on the line of departure at which an attacking force in column crosses.

PORT OF DEBARKATION – The geographic point at which cargo or personnel are discharged. This may be a seaport or aerial port of debarkation; for unit requirements; it may or may not coincide with the destination. Also called POD.

PORT OF EMBARKATION – The geographic point in a routing scheme from which cargo or personnel depart. This may be a seaport or aerial port from which personnel and equipment flow to a port of debarkation; for unit and non-unit requirements, it may or may not coincide with the origin. Also called POE.

POINT OF ORIGIN – In distribution operations, the beginning point of a deployment, redeployment, or movement where forces or materiel are located.

POLITICAL WARFARE – Aggressive use of political means to achieve national objectives.

POSITION – The location of a gun, unit, or individual from which fire can be delivered upon a given target.

POST – The prescribed limits of a sentry's responsibility.

PREARRANGED FIRE – Fire that is formally planned and executed against targets or target areas of known location. Such fire is usually planned well in advance and is executed at a predetermined time or during a predetermined period of time.

PRINCIPAL DIRECTION OF FIRE – A specific direction within the sector of fire of a flat-trajectory weapon, which is designated as its primary fire mission. Within a rifle platoon, automatic weapons are assigned a principal direction of fire. Units are not assigned principal directions of fire nor can a weapon be assigned more than one principal direction of fire. Also called PDF.

PROBABLE LINE OF DEPLOYMENT– The location on the ground where the commander of a force plans to complete final deployment before moving out with squads as skirmishers.

PROPAGANDA – Any information, ideas, doctrines, or special appeals spread to influence the opinions, emotions, attitudes, or behavior of any specified group to benefit the sponsor, either directly or indirectly.

PROPELLING CHARGE – An explosive that throws the projectile from a gun.

PROTECTIVE FIRE – Fire delivered by supporting weapons and directed against the enemy for the purpose of hindering his fire or movement against friendly attacking units.

QUICK TIME – Cadence at 120 steps (12, 15, or 30 inches in length) per minute.

RADIO CHANNEL – A band of adjacent frequencies having sufficient width to permit its use for radio communications.

RAID – An operation, usually small scale, involving a swift penetration of hostile territory to secure information, confuse the enemy, or destroy his installations. The operation ends with a planned withdrawal upon completion of the assigned mission.

RANK – A line of men or vehicles placed side by side; officer's grade or position.

REAR – The direction away from the enemy.

REAR AREA – The area in the rear of the combat and forward areas.

REAR GUARD – The security element that follows and protects the rear of a marching force.

REBELLION – Organized, armed, open resistance to the authority or government in power.

RECONNAISSANCE PATROL – A patrol whose mission is to gain information about the enemy and the terrain.

REGISTRATION – The adjustment of fire to determine firing corrections.

RELAY – A transmission forwarded through an intermediate station.

RELEASE POINT – A point at which a higher command releases control of a unit to its commander.

RELIEF OF FRONT-LINE UNITS – A rearrangement of units in which the rear unit moves forward to the battle position and occupies the defensive positions there; at the same time the forward unit in the battle position relinquishes these positions and moves to the rear.

REPEAT – A command or request to fire again the same number of rounds with the same method of fire.

RESERVE – An element of the battalion or higher unit held initially under the control of the commander as a maneuvering element to influence future action.

RESERVE AREA – The area that extends from the rear of the forward defense area to the rear of the battle area. The Reserve Force is located in the reserve area.

RETIREMENT – An operation in which a force withdraws without enemy pressure to avoid combat under the existing situation.

REVERSE SLOPE – Any slope that descends away from the enemy.

REVOLT – A casting off of allegiance or a refusal to submit to established authority.

REVOLUTION – A rebellion that succeeds in overthrowing an old government and establishing a new one.

RIOT CONTROL AGENT – Any chemical, not listed in a schedule of the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction, which can produce sensory irritation or disabling physical effects rapidly in humans, which disappear within a short time following termination of exposure. Also called RCA.

ROADBLOCK – A barrier or obstacle to block or limit the movement of hostile vehicles along a road.

ROUTE MARCH – The advance in column on roads.

RULES OF ENGAGEMENT – Directives issued by competent military authority that delineate the circumstances and limitations under which United States forces will initiate and/or continue combat engagement with other forces encountered. Also called ROE.

SCREEN FIRE – A curtain of smoke that protects a force from enemy ground observation.

SEARCHING FIRE – Fire distributed in depth by successive changes in elevation of a weapon.

SECTION – A military unit that is smaller than a platoon and larger than a squad; the basic tactical unit in the weapons platoon of the rifle company.

SECTOR – A clearly defined area that a given unit protects or covers with fire.

SECTOR OF FIRE – A section of terrain designated by boundaries that is assigned to a unit or to a weapon to cover by fire.

SECURITY – Measures taken by a command to protect itself from espionage, observation, sabotage, annoyance, or surprise.

SECURITY AREA – The area forward of the FLOT assigned to a battalion or company. A battalion's security area extends to whatever distance security forces, uncontrolled by the battalion, are employed. A company's security area extends 400 to 500 yards (maximum effective range of small-arms fire) to the most forward extension of the company's lateral boundary.

SHOCK ACTION – Actual hand-to-hand combat between opposing troops; an offensive movement by fast-moving forces in which they tend to overrun the enemy by the force of their own momentum.

SHORT – A spotting or an observation used by a spotter or an observer to indicate that a burst fell short of the target in relation to a line perpendicular to the spotting line.

SITUATION REPORT – A report giving the situation in the area of a reporting unit or formation. Also called SITREP.

SKETCH – A hasty, pictorial drawing showing only desired map features and objects in relative position; usually for a specific use.

SKIRMISHERS – A line of troops in extended order during a tactical exercise or attack.

SNAP– In commands or signals, the quality that inspires immediate response.

SPOT REPORT – A concise narrative report of essential information covering events or conditions that may have an immediate and significant effect on current planning and operations that is afforded the most expeditious means of transmission consistent with requisite security. Also called SPOTREP.

STANDARD OPERATING PROCEDURE – A set of instructions covering those features of operations which lend themselves to a definite or standardized procedure without loss of effectiveness. The procedure is applicable unless ordered otherwise. Also called SOP.

STATIC – Any electrical disturbance caused by atmospheric conditions. Interferes with radio communications.

STEP – The distance from heel to heel between the feet of a marching man; normally 30 inches.

SUPPLEMENTARY POSITION – An extra position other than the designated primary or alternate position.

SUPPLY POINT – A point where supplies are issued (for example, depot, railhead, truck head, airhead, or navigation-head).

SUPPORT – (1) The action of a force that aids, protects, complements, or sustains another force according to a directive requiring such actions. (2) A unit that helps another unit in battle. (3) The reserve of a rifle company or platoon in the attack or defense; an element of a command that assists, protects, or supplies other forces in combat.

SUPPORTING FIRE – Fire delivered by weapons of supporting units to assist or protect a unit in combat.

SUPPORTING WEAPONS – Weapons other than those with which a rifle unit is normally equipped.

SUPPRESSION – Temporary or transient degradation by an opposing force of the performance of a weapons system below the level needed to fulfill its mission objectives.

SUPPRESSIVE FIRE – Fires on or about a weapons system to degrade its performance below the level needed to fulfill its mission objectives, during the conduct of the fire mission.

SURVIVABILITY – Concept which includes all aspects of protecting personnel, weapons, and supplies while simultaneously deceiving the enemy. Survivability tactics include building a good defense; employing frequent movement; using concealment, deception, and camouflage; and constructing fighting and protective positions for both individuals and equipment.

TABLE OF ALLOWANCE – An equipment allowance document that prescribes basic allowances of organizational equipment, and provides the control to develop, revise, or change equipment authorization inventory data. Also called TOA.

TERRAIN – An area of ground, considered as to its extent and natural features, in relation to its use in a particular operation.

TERRAIN ANALYSIS – The collection, analysis, evaluation, and interpretation of geographic information on the natural and man-made features of the terrain, combined with other relevant factors, to predict the effect of the terrain on military operations.

THEATER – The geographical area for which a commander of a geographic combatant command has been assigned responsibility.

THEATER OF OPERATIONS – An operational area defined by the geographic combatant commander for the conduct or support of specific military operations.

Multiple theaters of operations normally will be geographically separate and focused on different missions. Theaters of operations are usually of significant size, allowing for operations in depth and over extended periods of time. Also called TO.

TOPOGRAPHICAL CREST – The highest point on elevated terrain.

TRAJECTORY – The path described by a projectile in flight.

TRAVERSING FIRE – Fire distributed in width by successive changes in direction of a weapon.

UNDERGROUND – A civilian organization that supports the resistance movement through covert (secret) actions. Such actions include intelligence collection, subversion, sabotage, terror, assassination, and dissemination of propaganda in areas denied to the guerrilla force.

UNIT – Any military force having a prescribed organization.

UNIT MOVEMENT CONTROL CENTER – A temporary organization activated by major subordinate commands and subordinate units during deployment to control and manage marshalling and movement. Also called UMCC.

UNIT OF FIRE – A unit of measure for ammunition supply. It represents a specific number of rounds of ammunition per weapon.

WARNING ORDER – (1) A preliminary notice of an order or action that is to follow. (2) A planning directive that initiates the development and evaluation of military courses of action by a supported commander and requests that the supported commander submit a commander's estimate. (3) A planning directive that describes the situation; allocates forces, and resources; establishes command relationships; provides other initial planning guidance; and initiates subordinate unit mission planning. Also called WARNORD.

WEDGE FORMATION – A tactical formation in the form of a *V* with the point toward the enemy; a formation with elements in echelon to the right and left rear. Also called a V-formation.

WITHDRAWAL – A movement whereby a force disengages from an enemy force according to the will of the commander.

ZONE OF ACTION – A geographical area within which a military unit is to act, and for which it is responsible.

ZONE OF FIRE – An area into which a particular unit delivers, or is prepared to deliver, fire.

Trainee Feedback

Center for Seabees and Facilities Engineering (CSFE) makes every effort to keep their courses up-to-date and free of technical errors. If you have a suggestion, found an error or inaccuracy, please write, FAX or email us by using the form below. Use one form for each comment and be sure to fill in the information as accurately and detailed as possible. Thank you for your assistance.

Write: CSFE
NCF Training Division (N7B)
3502 Goodspeed St.
Port Hueneme, CA 93043-4337

FAX: (805) 982-5508 / DSN 551-5508

E-mail: CSFE_CBCH@navy.mil

Trainee Feedback Form

Course: Seabee Combat Handbook, Volume ____, NAVEDTRA: _____

Course Date: _____ Chapter Number: _____ Page: _____

Paragraph: _____ Sentence: _____ Figure: _____ Frame/View: _____

Description: _____
_____
_____
_____
_____
_____

(optional) Corrective action: _____
_____
_____

(optional) Supporting reference(s): _____
_____

Your email address, if a response is requested: _____

Appendix II

Acronyms

AAA	Arrival and Assembly Area
AACG	Arrival Airfield Control Group
ABFC	Advance Base Functional Component
AC	Active Component
ACB	Amphibious Construction Battalion
ACE	Aviation Combat Element (MAGTF)
ACL	Allowable Cabin Load
ACOC	Alternate Command/Combat Operations Center
ACR	Allowance Change Request
ADAL	Authorized Dental Allowance List
ADCON	Administrative Control
ADDRAC	**A**lert, **D**irection, target **D**escription, **R**ange, target **A**ssignment, and fire **C**ontrol
ADR	Airfield Damage Repair
ADSW	Active Duty for Special Work
ADT	Active Duty for Training
ADVON	Advanced Echelon
ALCON	All Concerned
AMAL	Authorized Medical Allowance List
AMC	Air Mobility Command
AMMO	Ammunition
AO	Administration Officer
AO	Area of Operations
AOR	Area Of Responsibility
APOD	Aerial Port Of Debarkation
APOE	Aerial Port Of Embarkation

APL	Assistant Patrol Leader
AR	Automatic Rifleman
ASAP	As Soon As Possible
ASP	Ammunition Supply Point
ASR	Alternate Supply Route
AT	Antitank
AT	Annual Training
AT/FP	Antiterrorism/Force Protection
AVGAS	Aviation Gasoline
BAMCIS	**B**egin planning, **A**rrange for reconnaissance, **M**ake reconnaissance, **C**omplete the plan, **I**ssue the order, and **S**upervise
BAS	Basic Aid Station
BDA	Battle Damage Assessment
BDR	Battle Damage Repair
BFT	Blue Force Tracking/Tracker
BN	Battalion
BTB	Better Than Best
BU	Builder
BUB	Battle Update Brief
C2	Command and Control
C3	Command, Control, and Communications
CA	Civil Affairs
CALMS	Computer-Aided Load Manifesting System
CAM	Chemical Agent Monitor
CAS	Close Air Support
CASEVAC	Casualty Evacuation
CASREP	Casualty Report
CASREQ	Close Air Support Request
CB	Construction Battalion (SEABEE)

CBR	Chemical, Biological, Radiological
CBRN	Chemical, Biological, Radiological and Nuclear
CCI	Controlled Cryptographic Item
CCIR	Commander's Critical Information Requirement
CDD	Construction Diving Detachments
CDM	Chemical Downwind Message
CDO	Command Duty Officer
CDR	Commander
CE	Construction Electrician
CE	Command Element (MAGTF)
CEB	Combat Engineer Battalion (USMC)
CEC	Civil Engineer Corps
CEOI	Communications-Electronics Operating Instructions
CESE	Civil Engineer Support Equipment
CLP	Cleaning, Lubricant, Petroleum
CM	Construction Mechanic
CMDCM	Command Master Chief
CNO	Chief of Naval Operations
CO	Commanding Officer
COA	Course Of Action
COC	Command/Combat Operations Center
COMSEC	Communications Security
CONOPS	Concept of Operations
CONUS	Continental United States
COSAL	Consolidated Shipboard/Shorebased Allowance List
COTS	**C**ommercial **O**ff-**T**he-**S**helf equipment/material
CP	Command Post
CPX	Command Post Exercise
CS	Combat Support

CST	Convoy Security Team
DACG	Departure Airfield Control Group
DAT	Damage Assessment Team
DFAC	Dining Facility
DFT	Deployment For Training
DIRLAUTH	Direct Liaison Authorized
DOD	Department Of Defense
DOR	Date Of Rank
DRAW-D	Defend, Reinforce, Attack, Withdraw, Delay
DTD	Detailed Troop Decontamination
DTG	Date Time Group
DV	Diver
EA	Engineering Aid
EAF	Expeditionary Airfield
ECP	Entry Control Point
ECU	Environmental Control Unit
EDVR	Enlisted Distribution Verification Report
EEFI	Essential Elements of Friendly Information
EKIA	Enemy Killed In Action
ELCAS (M)	Elevated Causeway System (Modular)
EMP	Electromagnetic Pulse
ENDEX	Exercise Termination
EO	Equipment Operator
EOD	Explosive Ordinance Disposal
EPW	Enemy Prisoner of War
ESB	Engineer Support Battalion (USMC)
ETA	Estimated Time of Arrival
FEBA	Forward Edge of the Battle Area
FIE	Fly In Echelon

FLOT	Forward Line of Own Troops
FM	Field Manual (Army)
FMF	Fleet Marine Force
FO	Forward Observer
FOB	Forward Operating Base
FOUO	For Official Use Only
FP	Force Protection
FPCON	Force Protection Condition
FPF	Final Protective Fire
FPL	Final Protective Line
FRAGO/FRAGORD	Fragmentary Order
FSSG	Field Service Support Group (USMC) (Now MLG)
FTX	Field Training Exercise
FYSA	For Your Situational Awareness
GCE	Ground Combat Element (MAGTF)
GP	General Purpose
GPH	Gallons Per Hour
GPS	Global Positioning System
GRG	Gridded Reference Graphic
GVW	Gross Vehicle Weight
GWOT	Global War On Terror
HAS	Higher Adjacent Supporting
HAZMAT	Hazardous Material
HE	High Explosive
HEAT	High Explosive Antitank
HEDP	High Explosive Dual Purpose
HEI	High Explosive-Incendiary
HLZ	Helicopter Landing Zone
HM/HW	Hazardous Material/Hazardous Waste

HMMWV	High Mobility Multipurpose Wheeled Vehicle
HN	Host Nation
HQ	Headquarters
HTH	High Test Hypochlorite (Bleach)
HUMINT	Human Intelligence
IAW	In Accordance With
ID	Identification
IDC	Independent Duty Corpsman
IED	Improvised Explosive Device
ILLUM	Illumination
IR	Infrared
ISAF	International Security Assistance Force
ISB	Intermediate Staging Base
IV	Intravenous
JARB	Joint Acquisition Review Board
JFUB	Joint Facilities Utilization Board
JLOTS	Joint Logistics Over The Shore
JOC	Joint Operations Center
JOOD	Junior Officer Of the Day
JSOTF	Joint Special Operations Task Force
JTF	Joint Task Force
KIA	Killed In Action
KOCOA	**K**ey terrain, **O**bservation and fields of fire, **C**over and concealment, **O**bstacles, and **A**venues of approach
LCE	Logistics Combat Element (MAGTF)
LCU	Landing Craft, Utility
LOGREP	Logistics Report
LOGREQ	Logistics Requirements
LOTS	Logistics Over The Shore
LP	Listening Post

LSA	Logistics Support Area
LZ	Landing Zone
MAGTF	Marine Air-Ground Task Force
MCDP	Marine Corps Doctrine Publication
MCPON	Master Chief Petty Officer of the Navy
MCRP	Marine Corps Reference Publication
MCWP	Marine Corps Warfighting Publication
MEB	Marine Expeditionary Brigade
MADCAP	Medical Civic Action Program
MEDEVAC	Medical Evacuation
MEF	Marine Expeditionary Force
METL	Mission-Essential Task List
METT-T	**M**ission, **E**nemy, **T**errain and weather, **T**roops and support available, and **T**ime available
MEU	Marine Expeditionary Unit
MEU(SOC)	Marine Expeditionary Unit (Special Operations Capable)
MGB	Medium Girder Bridge
MHE	Material Handling Equipment
MIA	Missing In Action
MILVAN	Military Van (Container)
MLG	Marine Logistics Group
MNF	Multinational Force
MOA	Memorandum Of Agreement
MOCC	Mount Out Control Center
MOGAS	Motor Gasoline
MOOTW	Military Operations Other Than War
MOPP	Mission-Orientated Protective Posture
MOS	Military Occupational Specialty
MOU	Memorandum Of Understanding
MOUT	Military Operations on Urbanized Terrain

MP	Military Police
MPF	Maritime Pre-positioning Force
MPS	Maritime Pre-positioning Ship
MPSRON	Maritime Pre-positioning Ship Squadron
MRE	Meal, Ready-to-Eat
MSC	Military Sealift Command
MSDS	Material Safety Data Sheet
MSR	Main Supply Route
MWD	Military Working Dog
MWSS	Marine Wing Support Squadron (USMC)
NAAK	Nerve Agent Antidote Kit
NATO	North Atlantic Treaty Organization
NAVFAC	Naval Facilities Engineering Command
NAVFACENGCOM	Naval Facilities Engineering Command
NBC	Nuclear, Biological, and Chemical
NCF	Naval Construction Force
NCHB	Navy Cargo-Handling Battalion
NCO	Noncommissioned Officer
NCOIC	Noncommissioned Officer In Charge
NCR	Naval Construction Regiment
NECC	Navy Expeditionary Combat Command
NEO	Noncombatant Evacuation Operation
NFELC	Naval Facilities Expeditionary Logistics Center
NFESC	Naval Facilities Engineering Service Center
NIPRNET	Nonsecure Internet Protocol Router Network
NMCB	Naval Mobile Construction Battalion
NOD	Night Observation Device
NOK	Next Of Kin
NSE	Naval Support Element

NSN	National Stock Number
NSW	Naval Special Warfare
NVG	Night Vision Goggles
1NCD	First Naval Construction Division
OBFS	Offshore Bulk Fuel System
OD	Olive Drab
OEF	Operation ENDURING FREEDOM
OEM	Original Equipment Manufacturer
OIC	Officer In Charge
OICC	Officer In Charge of Construction
OIF	Operation IRAQI FREEDOM
OJT	On-the-Job Training
OOD	Officer Of the Day
OP	Observation Post
OPCON	Operational Control
OPDS	Offshore Petroleum Distribution System
OPLAN	Operational Plan
OPORD	Operational Order
OPREP	Operational Report
OPS	Operations
OPSEC	Operational Security
OPTAR	Operating Target
ORM	Operational Risk Management
ORP	Objective Rally Point
PAO	Public Affairs Officer
PAX	Passengers
PB4T	Planning Board for Training
PDF	Principle Direction of Fire
PERSTAT	Personnel Status Report

PHIBCB	Amphibious Construction Battalion
PL	Phase Line
PLGR	Precision Lightweight GPS Receiver
PLT	Platoon
POD	Port of Debarkation
POE	Port Of Embarkation
POE	Projected Operational Environment
POL	Petroleum, Oils, and Lubricants
POOW	Petty Officer Of the Watch
POS	Position
POW	Prisoner Of War
PPE	Personal Protective Equipment
PPM	Parts Per Million
Prime BEEF	Prime Base Engineer Emergency Force (USAF)
PYRO	Pyrotechnic
QDR	Quality Deficiency Report
QRF	Quick Response Force
R1	Rifleman number one
R2	Rifleman number two
RC	Reserve Component
RCT	Regimental Combat Team
RDD	Required Delivery Date
RED HORSE	Rapid Engineers Deployable Heavy Operations Repair Squadron, Engineers (USAF)
Recon	Reconnaissance
RFF	Request For Forces
RFI	Request For Information
ROC	Required Operational Capabilities
ROE	Rules Of Engagement
ROICC	Resident Officer In Charge of Construction

RORO	Roll-On, Roll-Off
RPM	Rounds Per Minute
RRR	Rapid Runway Repair (Replaced by ADR)
RSO	Range Safety Officer
R/T	Receiver-Transmitter
RT	Rough Terrain
RTB	Return To Base
S1	Administration Officer
S2	Intelligence Officer
S3	Operations Officer
S4	Supply Officer
S6	Communication Officer
S7	Training Officer
SA	Situational Awareness
SAFE	Security, Automatic weapons, Fields of fire, Entrenchment
SALUTE	Size, Activity, Location, Uniform, Time, Equipment
SAR	Search and Rescue
SATCOM	Satellite Communications
SAW	Squad Automatic Weapon
SEA	South East Asia
SEA	Senior Enlisted Advisor
SEABEE	Navy Construction Engineer
SECNAV	Secretary of the Navy
SECNAVINST	Secretary of the Navy Instruction
SELRES	Selected Reserve
SF	Standard Form
SF	Special Forces
SIGINT	Signals Intelligence
SIGSEC	Signal Security

SINCGARS	Single-Channel Ground and Airborne Radio System
SIPRNET	SECRET Internet Protocol Router Network
SITREP	Situational Report
SJA	Staff Judge Advocate
SME	Subject Matter Expert
SMEAC	Situation, Mission, Execution, Administration, and Command and signal
SN	Serial Number
SOF	Special Operations Forces
SOFA	Status Of Forces Agreement
SOP	Standard Operating Procedure
SORTS	Status of Resources and Training System
SPECWAR	Special Warfare
SPOD	Seaport Of Debarkation
SPOE	Seaport of Embarkation
SPOTREP	Spot Report
SRG	Seabee Readiness Group
STANAG	Standardization Agreement (NATO)
STB	Super Tropical Bleach
STU	Secure Telephone Unit
SW	Steelworker
SWBD	Switchboard
TACON	Tactical Control
TBD	To Be Determined
TDN	Tactical Data Network
TM	Technical Manual
TOA	Table Of Allowance
TOC	Tactical Operations Center
TPFDD	Time-Phased Force and Deployment Data
TPI	Two-Person Integrity

TRICON	Triple Container
TTP	Tactics, Techniques, and Procedures
UAV	Unmanned Aerial Vehicle
UCMJ	Uniform Code of Military Justice
UCT	Underwater Construction Team
UIC	Unit Identification Code
UMCC	Unit Movement Control Center
UN	United Nations
UT	Utilitiesman
USACE	United States Army Corps of Engineers
UXO	Unexploded Explosive Ordnance
VBIED	Vehicle-Borne Improvised Explosive Device
VTOL	Vertical Takeoff and Landing
WARNORD	Warning Order
WIA	Wounded In Action
WMD	Weapons of Mass Destruction
XO	Executive Officer

Appendix III

Work/Rest Table

Table III-1 — Work/Rest Cycles and Water Replacement Guidelines

Heat Category	WBGT Index (°F) [1, 2]	Light (Easy) Work		Moderate Work		Hard (Heavy) Work	
		Work/Rest (minutes) [4,5]	Water Intake (qt/hr) [3]	Work/Rest (minutes) [4,5]	Water Intake (qt/hr)[3]	Work/Rest (minutes)	Water Intake (qt/hr)
1	78–81.9	No limit	½	No limit	¾	40/20	¾
2 (Green)	82–84.9	No limit	½	50/10	¾	30/30	1
3 (Yellow)	85–87.9	No limit	¾	40/20	¾	30/30	1
4 (Red)	88–89.9	No limit	¾	30/30	¾	20/40	1
5 (Black)	More than 90	50/10	1	20/40	1	10/50	1

NOTE:

1. Wearing all Mission-Oriented Protective Posture (MOPP) overgarments (MOPP4) adds 10°F to the Wet Bulb Globe Temperature (WBGT) index.
2. If wearing body armor, add 5°F to WBGT in humid climates.
3. Hourly fluid intake should not exceed 1¼ quarts, and daily fluid intake should not exceed 12 liters.
4. Rest means minimal physical activity (sitting or standing), accomplished in the shade if possible. The information pertains to acclimated service personnel.
5. The work/rest time and fluid replacement volumes will sustain performance and hydration for at least 4 hours of work in the specified heat category. Individual water needs will vary ±¼ qt/hr.

INDEX

A

Action under flares, 4-7
Airway opening, 10-15, 10-17, 10-18
    abdominal thrust, 10-19
    chest thrust , 10-20
    head tilt or chin lift, 10-17
    jaw thrust technique, 10-17
Amphibious Construction Battalions (PHIBCBs), 1-40
AN/GRA-39, 3-14
AN/PRC-117F manpack radio, 3-11
AN/PRC-119 radio, 3-5
AN/PRC-150 radio transceiver, 3-10
AN/PRC-152 radio, 3-13
AN/PYQ-10 simple key loader, 3-17
AN/VRC-90D radio, 3-9
Antennas, 3-21
AT4 (M136) 84-MM launcher and cartridge, 12-33
    aiming, 12-40
    ammunition, 12-45
    controls, 12-36
    destruction, 12-45
    engaging the target, 12-44
    firing positions, 12-41
    inspection before firing, 12-36
    misfire procedures, 12-40
    operation, 12-38
    safety procedures, 12-46
    sights, 12-35

B

Barbed-wire entanglements, 8-2
    barbed-steel tape, 8-7
    barbed-wire, standard, 8-6
    classification, 8-2
    pickets, 8-9
    site and layout, 8-2
Beadwindow codes, 3-37
Blue force tracker, 3-20
Breathing, 10-15
Burn injuries, 10-31
    chemical, 10-31
    classification, 10-31
    electrical, 10-31
    thermal, 10-31
    white phosphorous, 10-32

C

Camouflage, 6-9, 7-4, 7-9
CBR-N contamination detection and identification, 9-5
biological contamination symptoms, 9-8
chemical agent symptoms, 9-6
marking contaminated areas, 9-31
nuclear radiation symptoms, 9-8
CBR-N unit equipment, 9-26
CBR-N weapon effects, 9-3
biological, 9-3
chemical agent, 9-6
nuclear, 9-4
Circulation, 10-5
Civil Engineer Corps, 1-3
Code of the U.S. Fighting Force, 1-48
Cold weather injuries, 10-32, 10-34
frostbite, 10-36
hypothermia, 10-37
immersion syndrome, foot (trench foot), 10-36
Combat signals, 3-38
combat arm and hand signals, 3-40
Combat tent, 2-11
Concealment, 7-8
dug-in emplacements, 7-4
fresh soil, 7-3
Concertina fence entanglements, 8-14
basic considerations, 8-33
defensive position requirements, 8-34
portable barbed-wire obstacles, 8-31
standard, 8-14, 8-25
ties, 8-17
triple standard, 8-25
wire installation, 8-20
Counterambush drills, 4-33
CPR, 10-15
Crawling, 4-4

E

84-MM (AT4) M136 launcher and cartridge, 12-33
aiming, 12-40
ammunition, 12-45
controls, 12-36
destruction, 12-45
engaging the target, 12-44
firing positions, 12-41
inspection before firing, 12-36
misfire procedures, 12-40
operation, 12-38
safety procedures, 12-46
sights, 12-35
Escape, 6-44

Evasion, 6-3
Evasion travel, 6-13

F

Field message format and preparation, 3-35
Field sanitation, 10-38
    waste disposal devices, 10-40
    latrines, 10-40, 10-41, 10-42
    urinals, 10-43
    water purification, 10-45
.50-caliber machine gun, M2, 12-11
    characteristics, 12-12
    cycle of operation, 12-14, 12-17
    headspace and timing adjustments, 12-18
    loading, 12-16
    operation, 12-15
Fighting emplacements, 7-3
Final protective lines, 13-20
Fire commands, 13-19
First-aid, basic, general rules, 10-2, 10-3, 10-25
First aid measures, 10-8
Flares, trip, 14-25
Formations, 4-8
    combat, 4-8
    fire team movement, 4-8
    patrol, 4-16
    rifle company, 4-13
    rifle platoon, 4-12
    rifle squad, 4-10
40-MM grenade launcher, M203, 11-52
    ammunition, 11-60
    leaf sight zeroing, 11-57
    loading and firing, 11-58
    misfire, hangfire, and stoppage, 11-59
    safety considerations and warnings, 11-61
    unloading, 11-59
40-MM machine gun, MK 19 MOD 3, 12-22
    ammunition, 12-31
    cycle of operation, 12-24
    malfunctions, 12-24
    MK 93 MOD 2 gun cradle and M3 tripod, 12-30
Fractures, 10-24
    collarbone, 10-28
    jaw, 10-28
    spinal column, 10-29

G

Grenade launcher, M203, 40 MM, 11-52
    ammunition, 11-60

leaf sight zeroing, 11-57
loading and firing, 11-58
misfire, hangfire, and stoppage, 11-59
safety considerations and warnings, 11-61
unloading, 11-59
Grenades, hand, 14-3
components and characteristics, 14-4
general characteristics, 14-3
safety, 14-18
throwing procedures, 14-10
types and purposes, 14-4

H
Hand grenades, 14-3
components and characteristics, 14-4
general characteristics, 14-3
safety, 14-18
throwing procedures, 14-10
types and purposes, 14-4
Handheld signals, 14-27
inspecting, 14-31
M260 illumination ground signal kit, 14-35
misfire, 14-32
using handheld signal, 14-32
Headquarters company, 1-30
Heat injuries, 10-32
cramps, 10-33
exhaustion, 10-33
heatstroke, 10-34
Hitting the deck, 4-4

I
Illumination ground signal kit, M260 14 -35
Improvised Explosive Devices (IEDs), 14-36
identifying, 14-38
reaction upon encountering a possible IED, 14-37

L
Land mines, 14-20
characteristics and functioning, 14-20
claymore, M18A1, 14-21
coverage and methods of fire, 14-25
firing device, M57, 14-23
installation and firing, 14-24
Laws of Armed Conflict, 1-42
Laws of war, 1-43
personal conduct, 1-45
Lightweight Helmet (LWH), 2-7
Load-bearing infantry equipment, 2-4
personal gear issue (PGI), 2-4
combat field pack (CFP), 2-5

M

M136 (AT4) 84-MM launcher and cartridge, 12-33
aiming, 12-40
ammunition, 12-45
controls, 12-36
destruction, 12-45
engaging the target, 12-44
firing positions, 12-41
inspection before firing, 12-36
misfire procedures, 12-40
operation, 12-38
safety procedures, 12-46
sights, 12-35
M16A3 service rifle, 11-3
ammunition, 11-19
assembling, 11-11
caring and cleaning, 11-17
field-stripping, 11-7
loading rifle, 11-13
magazine loading, 11-13
magazine unloading, 11-15
malfunction and stoppage, 11-15
misfire and cook off, 11-16
sights, 11-6
unloading rifle, 11-14
M18A1 claymore mine, 14-21
M203 grenade launcher, 11-52
ammunition, 11-60
leaf sight zeroing, 11-57
loading and firing, 11-58
misfire, hangfire, and stoppage, 11-59
safety considerations and warnings, 11-61
unloading, 11-59
M260 illumination ground signal kit, 14-35
M57 firing device, 14-23
M9 service pistol, 9mm, 11-20
ammunition, 11-37
assembling, 11-25
caring and cleaning, 11-35
cycle of operation, 11-23
field-stripping, 11-23
immediate action, 11-31
loading magazine, 11-28
loading and firing, 11-29
malfunctions, 11-30
safety function checks, 11-27
unloading pistol, 11-30
unloading magazine, 11-30
Machine gun, MK 19 MOD 3, 40 MM, 12-22
ammunition, 12-31

cycle of operation, 12-24
malfunctions, 12-24
MK 93 MOD 2 gun cradle and M3 tripod, 12-30
Machine gun, M240, 12-3
ammunition, 12-10
characteristics, 12-2
components, 12-4
cook off, 12-9
cycle of operation, 12-5
loading, 12-6
malfunctions, 12-8
safety function check, 12-6
stoppage, 12-9
unloading, 12-8
Machine gun techniques of fire, 13-14
characteristics, 13-14
classes of fire, 13-16
fire commands, 13-19
fire control, 13-18
fire distribution, 13-19
overhead, 13-17
Maps and compass, 5-7
azimuth and back azimuth, 5-27
grids, 5-10
lensatic compass, 5-22
military symbols, 5-21
Marksmanship and techniques of fire, 13-1
machine gun, 13-14
pistol marksmanship, 13-9
rifle marksmanship, 13-3
Mines, land, 14-20
claymore, M18A1, 14-21
coverage and methods of fire, 14-25
firing device, M57, 14-23
installation and firing, 14-24
Mission-oriented protective posture (MOPP), 9-30
MK 19 MOD 3 40 MM, 12-22
ammunition, 12-31
cycle of operation, 12-24
malfunctions, 12-24
MK 93 MOD 2 gun cradle and M3 tripod, 12-30
Modular Tactical Vest (MTV), 2-10
Movement, 4-3
fire team, 4-8
silent, 4-5

N

Naval construction force (NCF), 1-23
Naval construction regiments (NCRs), 1-26
Naval mobile construction battalions (NMCBs), 1-28
Nuclear radiation, 9-5

O
Observation and fields of fire, 5-6
Obstructed airway clearing, 10-18
Overhead fires, 13-17

P
Patrol planning and preparation, 4-19
Phonetic alphabet and numerals, 3-32
Pistol, M9 service, 9mm, 11-20
    ammunition, 11-37
    assembling, 11-25
    caring and cleaning, 11-35
    cycle of operation, 11-23
    field-stripping, 11-23
    immediate action, 11-31
    loading magazine, 11-28
    loading and firing, 11-29
    malfunctions, 11-30
    safety function checks, 11-27
    unloading pistol, 11-30
    unloading magazine, 11-30
Pistol marksmanship, 13-9
    aiming, 13-10
    breath control, 13-10
    standing positions, 13-11
    trigger control, 13-10
Prowords, 3-31, 3-33
Pyrotechnics, 14-25

R
Radio and telephone procedures, 3-31
Radio/Radio sets
    AN/GRA-39, 3-14
    AN/PRC-117F manpack radio, 3-11
    AN/PRC-119, 3-5
    AN/PRC-150 radio transceiver, 3-10
    AN/PRC-152 radio, 3-13
    AN/VRC-90D radio, 3-9
Reconnaissance patrol, 4-15
Rescue breathing, 10-18
Rifle company headquarters, 1-31
Rifle marksmanship, 13-3
    aiming, 13-3
    breath control, 13-4
    shooting positions, 13-6
    trigger control, 13-5
Rifle, M16A3 service, 11-3
    ammunition, 11-19
    assembling, 11-11
    caring and cleaning, 11-17

field-stripping, 11-7
loading rifle, 11-13
magazine loading, 11-13
magazine unloading, 11-15
malfunction and stoppage, 11-15
misfire and cook off, 11-16
sights, 11-6
unloading rifle, 11-14
Rushing, 4-3

S
SB-22/PT telephone switchboard, 3-28
Seabee CBR defense responsibilities, 9-9
biological defense, 9-17
CBR equipment, 9-22
chemical defense, 9-9
decontamination, 9-17, 9-18
first aid and self-aid, 9-13
nuclear defense, 9-19
protective measures, 9-9, 9-10, 9-11
Seabees, the first, 1-6
Shock recognizing and treating, 10-23
causes, 10-23
first aid measures, 10-23
signs and symptoms 10-23
Shooting positions, 13-6
Sketches and overlays, 5-36
Sleep System, 2-13
Survival, 6-18
group, 6-21
individual, 6-22
techniques, 6-22

T
TA-312/PT telephone, 3-25
TA-838A telephone, 3-27
Tactical Data Network (TDN), 3-18
Tactical message format, 3-36
beadwindow codes, 3-37
combat signals, 3-38
security, 3-36
Telephone switchboard SB-22/PT, 3-28
Telephone, TA-312/PT, 3-25
Telephone, TA-838A, 3-27
Tent combat, 2-11

Topography, 5-4
Trip flares, 14-25

V
VINSON COMSEC KY-57, 3-12, 3-14

W

Warning order, 4-19
Written message, 3-38

INDEX

A

Action under flares, 4-7
Airway opening, 10-15, 10-17, 10-18
    abdominal thrust, 10-19
    chest thrust , 10-20
    head tilt or chin lift, 10-17
    jaw thrust technique, 10-17
Amphibious Construction Battalions (PHIBCBs), 1-40
AN/GRA-39, 3-14
AN/PRC-117F manpack radio, 3-11
AN/PRC-119 radio, 3-5
AN/PRC-150 radio transceiver, 3-10
AN/PRC-152 radio, 3-13
AN/PYQ-10 simple key loader, 3-17
AN/VRC-90D radio, 3-9
Antennas, 3-21
AT4 (M136) 84-MM launcher and cartridge, 12-33
    aiming, 12-40
    ammunition, 12-45
    controls, 12-36
    destruction, 12-45
    engaging the target, 12-44
    firing positions, 12-41
    inspection before firing, 12-36
    misfire procedures, 12-40
    operation, 12-38
    safety procedures, 12-46
    sights, 12-35

B

Barbed-wire entanglements, 8-2
    barbed-steel tape, 8-7
    barbed-wire, standard, 8-6
    classification, 8-2
    pickets, 8-9
    site and layout, 8-2
Beadwindow codes, 3-37
Blue force tracker, 3-20
Breathing, 10-15
Burn injuries, 10-31
    chemical, 10-31
    classification, 10-31
    electrical, 10-31
    thermal, 10-31
    white phosphorous, 10-32

C

Camouflage, 6-9, 7-4, 7-9
CBR-N contamination detection and identification, 9-5
biological contamination symptoms, 9-8
chemical agent symptoms, 9-6
marking contaminated areas, 9-31
nuclear radiation symptoms, 9-8
CBR-N unit equipment, 9-26
CBR-N weapon effects, 9-3
biological, 9-3
chemical agent, 9-6
nuclear, 9-4
Circulation, 10-5
Civil Engineer Corps, 1-3
Code of the U.S. Fighting Force, 1-48
Cold weather injuries, 10-32, 10-34
frostbite, 10-36
hypothermia, 10-37
immersion syndrome, foot (trench foot), 10-36
Combat signals, 3-38
combat arm and hand signals, 3-40
Combat tent, 2-11
Concealment, 7-8
dug-in emplacements, 7-4
fresh soil, 7-3
Concertina fence entanglements, 8-14
basic considerations, 8-33
defensive position requirements, 8-34
portable barbed-wire obstacles, 8-31
standard, 8-14, 8-25
ties, 8-17
triple standard, 8-25
wire installation, 8-20
Counterambush drills, 4-33
CPR, 10-15
Crawling, 4-4

E

84-MM (AT4) M136 launcher and cartridge, 12-33
aiming, 12-40
ammunition, 12-45
controls, 12-36
destruction, 12-45
engaging the target, 12-44
firing positions, 12-41
inspection before firing, 12-36
misfire procedures, 12-40
operation, 12-38
safety procedures, 12-46
sights, 12-35
Escape, 6-44

Evasion, 6-3
Evasion travel, 6-13

F

Field message format and preparation, 3-35
Field sanitation, 10-38
    waste disposal devices, 10-40
    latrines, 10-40, 10-41, 10-42
    urinals, 10-43
    water purification, 10-45
.50-caliber machine gun, M2, 12-11
    characteristics, 12-12
    cycle of operation, 12-14, 12-17
    headspace and timing adjustments, 12-18
    loading, 12-16
    operation, 12-15
Fighting emplacements, 7-3
Final protective lines, 13-20
Fire commands, 13-19
First-aid, basic, general rules, 10-2, 10-3, 10-25
First aid measures, 10-8
Flares, trip, 14-25
Formations, 4-8
    combat, 4-8
    fire team movement, 4-8
    patrol, 4-16
    rifle company, 4-13
    rifle platoon, 4-12
    rifle squad, 4-10
40-MM grenade launcher, M203, 11-52
    ammunition, 11-60
    leaf sight zeroing, 11-57
    loading and firing, 11-58
    misfire, hangfire, and stoppage, 11-59
    safety considerations and warnings, 11-61
    unloading, 11-59
40-MM machine gun, MK 19 MOD 3, 12-22
    ammunition, 12-31
    cycle of operation, 12-24
    malfunctions, 12-24
    MK 93 MOD 2 gun cradle and M3 tripod, 12-30
Fractures, 10-24
    collarbone, 10-28
    jaw, 10-28
    spinal column, 10-29

G

Grenade launcher, M203, 40 MM, 11-52
    ammunition, 11-60

leaf sight zeroing, 11-57
loading and firing, 11-58
misfire, hangfire, and stoppage, 11-59
safety considerations and warnings, 11-61
unloading, 11-59
Grenades, hand, 14-3
components and characteristics, 14-4
general characteristics, 14-3
safety, 14-18
throwing procedures, 14-10
types and purposes, 14-4

H
Hand grenades, 14-3
components and characteristics, 14-4
general characteristics, 14-3
safety, 14-18
throwing procedures, 14-10
types and purposes, 14-4
Handheld signals, 14-27
inspecting, 14-31
M260 illumination ground signal kit, 14-35
misfire, 14-32
using handheld signal, 14-32
Headquarters company, 1-30
Heat injuries, 10-32
cramps, 10-33
exhaustion, 10-33
heatstroke, 10-34
Hitting the deck, 4-4

I
Illumination ground signal kit, M260 14 -35
Improvised Explosive Devices (IEDs), 14-36
identifying, 14-38
reaction upon encountering a possible IED, 14-37

L
Land mines, 14-20
characteristics and functioning, 14-20
claymore, M18A1, 14-21
coverage and methods of fire, 14-25
firing device, M57, 14-23
installation and firing, 14-24
Laws of Armed Conflict, 1-42
Laws of war, 1-43
personal conduct, 1-45
Lightweight Helmet (LWH), 2-7
Load-bearing infantry equipment, 2-4
personal gear issue (PGI), 2-4
combat field pack (CFP), 2-5

M

M136 (AT4) 84-MM launcher and cartridge, 12-33
aiming, 12-40
ammunition, 12-45
controls, 12-36
destruction, 12-45
engaging the target, 12-44
firing positions, 12-41
inspection before firing, 12-36
misfire procedures, 12-40
operation, 12-38
safety procedures, 12-46
sights, 12-35
M16A3 service rifle, 11-3
ammunition, 11-19
assembling, 11-11
caring and cleaning, 11-17
field-stripping, 11-7
loading rifle, 11-13
magazine loading, 11-13
magazine unloading, 11-15
malfunction and stoppage, 11-15
misfire and cook off, 11-16
sights, 11-6
unloading rifle, 11-14
M18A1 claymore mine, 14-21
M203 grenade launcher, 11-52
ammunition, 11-60
leaf sight zeroing, 11-57
loading and firing, 11-58
misfire, hangfire, and stoppage, 11-59
safety considerations and warnings, 11-61
unloading, 11-59
M260 illumination ground signal kit, 14-35
M57 firing device, 14-23
M9 service pistol, 9mm, 11-20
ammunition, 11-37
assembling, 11-25
caring and cleaning, 11-35
cycle of operation, 11-23
field-stripping, 11-23
immediate action, 11-31
loading magazine, 11-28
loading and firing, 11-29
malfunctions, 11-30
safety function checks, 11-27
unloading pistol, 11-30
unloading magazine, 11-30
Machine gun, MK 19 MOD 3, 40 MM, 12-22
ammunition, 12-31

cycle of operation, 12-24
malfunctions, 12-24
MK 93 MOD 2 gun cradle and M3 tripod, 12-30
Machine gun, M240, 12-3
ammunition, 12-10
characteristics, 12-2
components, 12-4
cook off, 12-9
cycle of operation, 12-5
loading, 12-6
malfunctions, 12-8
safety function check, 12-6
stoppage, 12-9
unloading, 12-8
Machine gun techniques of fire, 13-14
characteristics, 13-14
classes of fire, 13-16
fire commands, 13-19
fire control, 13-18
fire distribution, 13-19
overhead, 13-17
Maps and compass, 5-7
azimuth and back azimuth, 5-27
grids, 5-10
lensatic compass, 5-22
military symbols, 5-21
Marksmanship and techniques of fire, 13-1
machine gun, 13-14
pistol marksmanship, 13-9
rifle marksmanship, 13-3
Mines, land, 14-20
claymore, M18A1, 14-21
coverage and methods of fire, 14-25
firing device, M57, 14-23
installation and firing, 14-24
Mission-oriented protective posture (MOPP), 9-30
MK 19 MOD 3 40 MM, 12-22
ammunition, 12-31
cycle of operation, 12-24
malfunctions, 12-24
MK 93 MOD 2 gun cradle and M3 tripod, 12-30
Modular Tactical Vest (MTV), 2-10
Movement, 4-3
fire team, 4-8
silent, 4-5

N

Naval construction force (NCF), 1-23
Naval construction regiments (NCRs), 1-26
Naval mobile construction battalions (NMCBs), 1-28
Nuclear radiation, 9-5

O
Observation and fields of fire, 5-6
Obstructed airway clearing, 10-18
Overhead fires, 13-17

P
Patrol planning and preparation, 4-19
Phonetic alphabet and numerals, 3-32
Pistol, M9 service, 9mm, 11-20
    ammunition, 11-37
    assembling, 11-25
    caring and cleaning, 11-35
    cycle of operation, 11-23
    field-stripping, 11-23
    immediate action, 11-31
    loading magazine, 11-28
    loading and firing, 11-29
    malfunctions, 11-30
    safety function checks, 11-27
    unloading pistol, 11-30
    unloading magazine, 11-30
Pistol marksmanship, 13-9
    aiming, 13-10
    breath control, 13-10
    standing positions, 13-11
    trigger control, 13-10
Prowords, 3-31, 3-33
Pyrotechnics, 14-25

R
Radio and telephone procedures, 3-31
Radio/Radio sets
    AN/GRA-39, 3-14
    AN/PRC-117F manpack radio, 3-11
    AN/PRC-119, 3-5
    AN/PRC-150 radio transceiver, 3-10
    AN/PRC-152 radio, 3-13
    AN/VRC-90D radio, 3-9
Reconnaissance patrol, 4-15
Rescue breathing, 10-18
Rifle company headquarters, 1-31
Rifle marksmanship, 13-3
    aiming, 13-3
    breath control, 13-4
    shooting positions, 13-6
    trigger control, 13-5
Rifle, M16A3 service, 11-3
    ammunition, 11-19
    assembling, 11-11
    caring and cleaning, 11-17

field-stripping, 11-7
loading rifle, 11-13
magazine loading, 11-13
magazine unloading, 11-15
malfunction and stoppage, 11-15
misfire and cook off, 11-16
sights, 11-6
unloading rifle, 11-14
Rushing, 4-3

S
SB-22/PT telephone switchboard, 3-28
Seabee CBR defense responsibilities, 9-9
biological defense, 9-17
CBR equipment, 9-22
chemical defense, 9-9
decontamination, 9-17, 9-18
first aid and self-aid, 9-13
nuclear defense, 9-19
protective measures, 9-9, 9-10, 9-11
Seabees, the first, 1-6
Shock recognizing and treating, 10-23
causes, 10-23
first aid measures, 10-23
signs and symptoms 10-23
Shooting positions, 13-6
Sketches and overlays, 5-36
Sleep System, 2-13
Survival, 6-18
group, 6-21
individual, 6-22
techniques, 6-22

T
TA-312/PT telephone, 3-25
TA-838A telephone, 3-27
Tactical Data Network (TDN), 3-18
Tactical message format, 3-36
beadwindow codes, 3-37
combat signals, 3-38
security, 3-36
Telephone switchboard SB-22/PT, 3-28
Telephone, TA-312/PT, 3-25
Telephone, TA-838A, 3-27
Tent combat, 2-11

Topography, 5-4
Trip flares, 14-25

V
VINSON COMSEC KY-57, 3-12, 3-14

W

Warning order, 4-19
Written message, 3-38